Canon

Service Manual

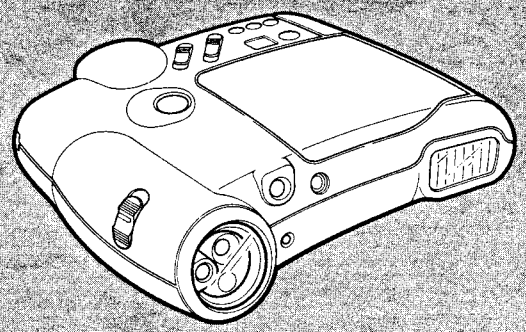
ENGLISH EDITION

STILL VIDEO SYSTEM

CANON STILL VIDEO CAMERA

RC-251

Ver.1



BATTERY PACK
BP-4P
BATTERY CHARGER
BA-24PB/E/A
AC COUPLER
AV-C25
RF-UNIT
RF-302E/A/F
TRANS CORDER
TC-E21
TELE CONVERTOR
TC-C2513
MINI PLUG-SCART CABLE
KE-M21
PIN-SCART CABLE
KE-P21

GENERAL
TECHNICAL EXPLANATION
REPAIR INSTRUCTION
ELECTRIC DIAGRAM
PARTS CATALOG

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SAFETY PRECAUTIONS

The following precautions should be observed when servicing.

1. Since many parts in the unit have special safety-related characteristics, always use genuine CANON replacement parts.
   Especially critical parts in the power circuit block should not be replaced with other makes.
   Critical parts are marked with ⚠ in the schematic diagrams.
2. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been oberheated or damaged by the short circuit.
3. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
4. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

4-1 Leakage Current Cold Check

(1) Unplug the AC cord and connect a jumper between the two prongs on the plug.

(2) Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metalic cabinet part on the equipment such as screw-heads, connectors, control shafts, etc. When the exposed metalic part has a return path to the chassis, the reading should be between 1MΩ and 5.2MΩ. When the exposed metal does not have a return path to the chassis, the reading must be ∞.

4-2 Leakage Current Hot Check

(1) Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.

(2) Connect a 1.5KΩ 10 watt resistor, paralleled by 0.15μF capacitor, between each exposed metalic parts on the unit and a good earth ground such as a water pipe, as shown in figure 1.

(3) Use an AC voltmeter, with 1000Ω volt or more sensitivity, to measure the potential across the resistor.

(4) Check all exposed metallic parts of the cover (Cable connection, Handle bracket, metallic cabinet. Screwheads, Metallic overlays, etc), and measure the voltage at each point.

(5) Reverse the AC plug in the AC outlet and repeat each of the above measurement.

(6) The potential at any point should not exceed 0.75V RMS.
   A leakage current tester (FLUKE MODEL: 8000A equivalent) may be used to make the hot checks. Leakage current must not exceed 0.5 milliamp. In case a measurement is out side of the limits specified, there is a possibility of a shock hazard, and corrective action must be taken before returning the instrument to the customer.

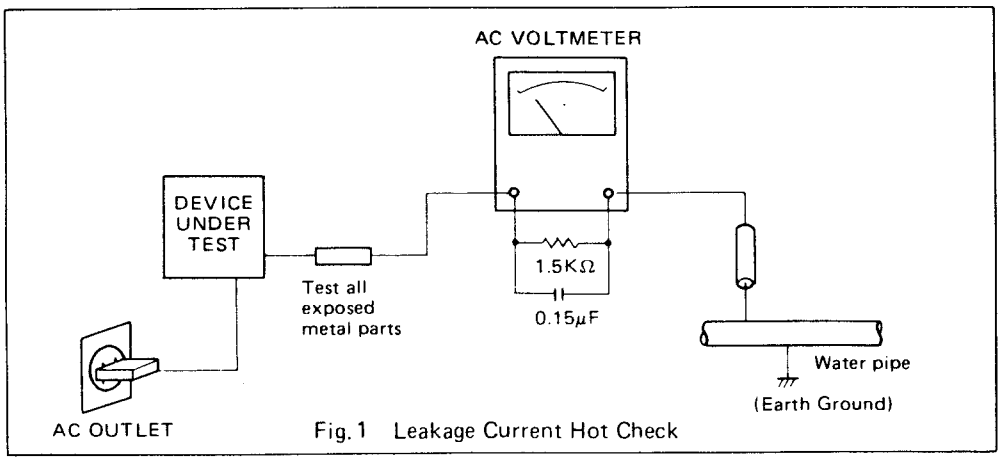

Fig. 1 Leakage Current Hot Check

MODELS

This manual covers the following products.
*Product name : Ref. No. (= Product code)

1) STILL VIDEO CAMERA
   RC-251 (White) : C81-0111-000 (European, U.K., French and Australian specs)
   RC-251 (Black) : C81-0112-000 (European, U.K., French and Australian specs)

2) BATTERY PACK
   BP-4P : C86-0272-000 (European, U.K., French and Australian specs)

3) BATTERY CHARGER
   BA-24PB : C86-0187-000 (U.K. specs)
   BA-24PE : C86-0188-000 (European and French specs)
   BA-24PA : C86-0189-000 (Australian specs)

4) AC COUPLER
   AV-C25 : C86-0651-000 (European, U.K., French and Australian specs)

5) RF-UNIT
   RF-302E : C86-0423-000 (European and U.K. specs)
   RF-302A : C86-0424-000 (Australian specs)
   RF-302F : C86-0425-000 (French specs)

6) TRANS CORDER
   TC-E21 : D89-0297-401 (French specs)

7) TELE CONVERTOR
   TC-C2513 : C86-0671-000 (European, U.K., French and Australian specs)

8) MINI PLUG-SCART CABLE
   KE-M21 : C86-0642-000 (European, U.K., French and Australian specs)

9) PIN-SCART CABLE
   KE-P21 : C86-0643-000 (European, U.K., French and Australian specs)

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1. SPECIFICATIONS

1-1. Still Video Camera RC-251

(1) Model	Lens shutter type still video camera
(2) Record	
1) Recording method	Complies with the high-band specifications (625-50 lines, field recording) of the unified standard of the Electronic Still Camera Standardization Committee
2) Video signal	Complies with the PAL color format
3) Recording medium	Still video floppy disk
(3) Image sensor	
1) Type	CCD image sensor
2) Transfer method	Full-frame transfer method
3) Structure	Virtual-phase single-phase drive
4) Screen size	6.4 mm H × 4.8 mm V (equivalent to 1/2 inch)
5) Total number of pixels	230,000 (786 H × 295 V)
6) Effective number of pixels	210,000 (739 H × 287 V)
7) Coloring method	R.G.B pure color stripe filter (on-chip type)
8) Output method	R.G.B separation output
(4) Lens	
1) Type	11 mm F2.8 fixed focus (equivalent to 60 mm on 35 mm camera)
2) Potential photographing range	1.0 m – ∞/30 cm for macro photography (from CCD image pickup surface)
(5) View finder	
1) Type	Real image type secondary image formation view finder (with dioptric adjustment of – 4 dpt to +2 dpt)
2) Magnification	× 0.55
3) Finder coverage	84%
(6) Shutter	
1) Type	2-blade programmed lens shutter
2) Shutter speed	1/500 second to 1/30 second
3) Flash sync speed	1/125 second
4) Release method	Electronic
(7) Exposure control	
1) Photometric system	Feed back AE by external photometric sensor (SPC) and CCD signal
2) Exposure control system	Program AE (1/30 second, F2.8 – 1/500 second, F22)
3) Photometric interlocking range	EV8 – EV18
4) Exposure compensation	+1.5 EV (with exposure compensation button on)
(8) Shooting	
1) Insert shooting	Shooting on any empty track on the floppy disk
2) White balance	Automatic pursuit system with external AWB sensor
3) Shooting modes	S: Normal shooting C: Continuous shooting mode (about 3 pictures/second)
4) Self timer	10-second delay
(9) Built-in Flash	
1) Type	Light adjusting type (external Adjustment by the EF sensor)
2) Radiation modes	AUTO: Automatic radiation below EV8 ON: Forced radiation OFF: No radiation
3) Guide number	7 (ISO100)
4) Recycling time	Shortest 0.3 second – Longest 3.0 seconds
5) Interlocking range	1 m – 3 m

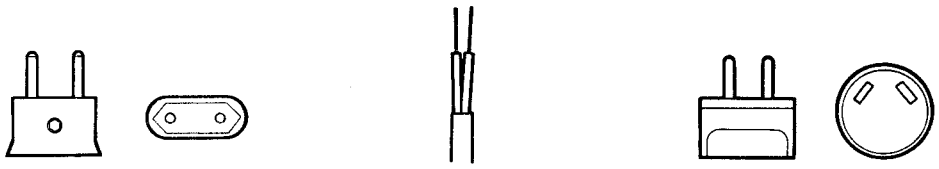
(10) Playback	
1) Video out signal	Complies with PAL color format
2) Scanning method	2:1 interlace/non-interlace switching (interlace for TV monitor)
3) Output	Video signal: 1 Vp-p, 75 Ω unbalanced (ϕ2.5 mm mini jack)
4) Horizontal resolution	Recorded and playback: Over 300 TVs Playback: Over 350 TVs
5) SN ratio	Over 39 dB
6) Playback stopping mechanism	When using battery pack BP-4P: about 2 minutes When using battery charger BA-24P: about 15 minutes (playback of the same track : restart with the shutter button ON)
7) Erasing	About 1.5 seconds/picture
(11) Display	
1) In view finder	LED lighting-up and blinking • Outside low brightness linkage range, Flash charging/charge up, warning (release prohibited) Macro photography display
2) Liquid crystal display panel	2-digit, 7-segment digital numerals interlocked with each button operation • Characters, [S], [C] and mark display Track No. Shooting mode (One-picture shooting/ Continuous shooting/ Self timer shooting) Video floppy status display (Not loaded/Shooting completed on all tracks/ Record prohibited floppy loaded) Battery condition (replacement warning/replacement display) Error display
(12) Power source	Rechargeable lead-acid battery Canon Battery Pack BP-4P (nominal 8 V, 200 mAh) or Battery Charger BA-24PE/BA-24PB/BA-24PA
(13) Others	
1) Tripod screw hole	For action grip (purchased separately)
2) Operating temperature and humidity	0°C to 40°C, below 90%
3) Storage temperature and humidity	– 30°C to 45°C, below 95%
4) Weight	About 425 g (without battery) About 490 g (including battery)

1-2. Battery Pack BP-4P

1) Type	Lead storage battery
2) Nominal voltage	8 V
3) Nominal capacity	200 mAh
4) Charging time	3.5 hours (by Battery Charger BA-24PE/BA-24PB/BA-24PA)
5) Performance (new pack, fully charged)	Recording (25°C, without flash): about 800 pictures (25°C, when flash is used for 25% of shooting): 200 to 300 pictures Playback: 10 to 15 minutes (25°C)
6) Operating temperature and humidity	Charging: 5°C to 40°C, below 90% Discharging: – 5°C to 40°C, below 90%
7) Storage temperature and humidity	5°C to 35°C, below 60%
8) Charging/discharging cycles	About 100
9) Outside dimensions	26 × 20 × 50 mm
10) Weight	68 g

1-3. Battery Charger BA-24PE/BA-24PB/BA-24PA

1) Input	100 VAC to 240 VAC +10%, – 15% 50/60 Hz
2) Output	Charging electrode: 9.9 V 0.14 A DC output terminal: 8.4 V 1.0 A (ϕ5.5 mm DC jack)
3) Charging time	About 80% charging [until Charge indicator (red LED) goes off]: About 60 minutes Full charging: About 210 minutes
4) Display	During AC input: Power indicator (red LED) lights. During charging: Charge indicator (red LED) lights. 80% charging completed: Charge indicator (red LED) goes off.
5) Plug shape	BA-24PE: C-2 (European type) BA-24PB: [no plug, cord with split ends] BA-24PA: 0 (Australian type)
6) Operating temperature and humidity	0°C to 40°C, below 85%
7) Outside dimensions	73 (W) × 146 (D) × 37.6 (H) mm
8) Weight	BA-24PE, A About 360 g BA-24PB About 340 g



[BA-24PE]
C-2 (European type)

[BA-24PB]
No plug, split-end cord

[BA-24PA]
0 (Australian type)

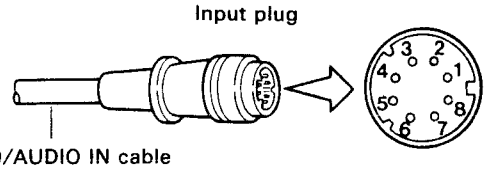
Types of Battery Charger plug

1-4. AC Coupler AV-C25

1) Input	8 VDC (ϕ5.5 mm DC jack) Video signal 1.0 Vp-p, 75Ω (ϕ2.5 mm mini plug)
2) Output	Video signal 1.0 Vp-p, 75Ω (RCA pin connector) Video signal for RF unit 1.0 Vp-p (8-pin connector) Power source for RF unit 5±0.3 VDC, 40 mA
3) Cable length (between the output unit and the coupler)	1.5 m
4) Outside dimensions	Output unit: 64 (W) × 26.5 (D) × 32.6 (H) mm (excluding projected parts) Coupler: 69.5 (W) × 34 (D) × 31.5 (H) mm
5) Weight	About 140 g

1-5. RF Unit RF-302E/RF-302F/RF-302A

1) Type	RF unit with built-in RF switch
2) Input impedance	700Ω (0.5 MHz) 40Ω (6.0 MHz)
3) Output impedance	75Ω unbalanced RF-302E: DIN plug RF-302F: DIN jack RF-302A: DIN plug
4) Television system	RF-302E, RF-302F: Complies with I/PAL, G/PAL format RF-302A: Complies with G/PAL format
5) Input cable length	1.2 m
6) TV output channel	RF-302E, RF-302F: 30 CH to 39 CH RF-302A: 0 CH/1 CH
7) Insertion loss	Maximum 4 dB (ANT IN – TV OUT) RF-302E, RF-302F: 47 to 870 MHz RF-302A: 45 to 870 MHz
8) Power source	5±0.3 VDC, below 50 mA (Supplied by BA-24PE/BA-24PB/BA-24PA)
9) Operating temperature and humidity	– 10°C to 50°C, below 85%
10) Storage temperature and humidity	– 20°C to 70°C, below 90%
11) Outside dimensions	50 (W) × 65 (D) × 24 (H) mm (excluding projected parts)
12) Weight	About 100 g



1. Video input
2. Video ground
3. Power supply input
4. Audio ground
5. NC
6. Audio input
7. NC
8. NC

Layout and functions of input cable pins

1-6. Transcoder TC-E21

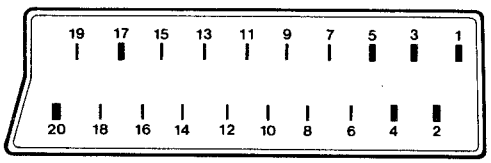
1) Type	Color video signal converter (PAL→SECAM)
2) Video signal	Complies with the PAL color format
3) Video input	PAL composite video signal 1Vp-p, 75Ω unbalanced Synchronous negative (special connector cable pin plug)
4) Video output	SECAM composite video signal 1Vp-p, 75Ω unbalanced Synchronous negative (BNC connector)
5) RF signal	SECAM color TV signal, 76 dBμ (when demodulated, 75Ω termination) 75Ω (DIN plug)
6) TV output channel	30 CH to 39 CH (set to 38 CH before shipment)
7) Power source	220 VAC, 50 Hz
8) Demand	6 W
9) Performance guarantee temperature and humidity	0°C to 40°C, below 85%
10) Operating guarantee temperature and humidity	– 5°C to 45°C, below 60%
11) Outside dimensions	135 (W) × 47 (H) × 157 (D) mm
12) Weight	About 1.3 kg

1-7. Teleconverter TC-C2513

1) Magnification	× 1.3
2) Focal distance when teleconverter is equipped	15 mm (equivalent to 80 mm on 35 mm camera)
3) Potential photographing range when teleconverter is equipped	1.6 m to ∞
4) Focusing surface of macro photography when teleconverter is equipped	47 cm from CCD image pickup surface

1-8. Mini Plug – SCART Cable KE-M21/Pin – SCART Cable KE-P21

1) Input	Video signal 1.0 Vp-p, 75Ω (KE-M21: φ2.5 mm mini plug) (KE-P21: RCA pin connector)
2) Output	Video signal 1.0 Vp-p, 75Ω (SCART connector)
3) Cable length	1.4 m



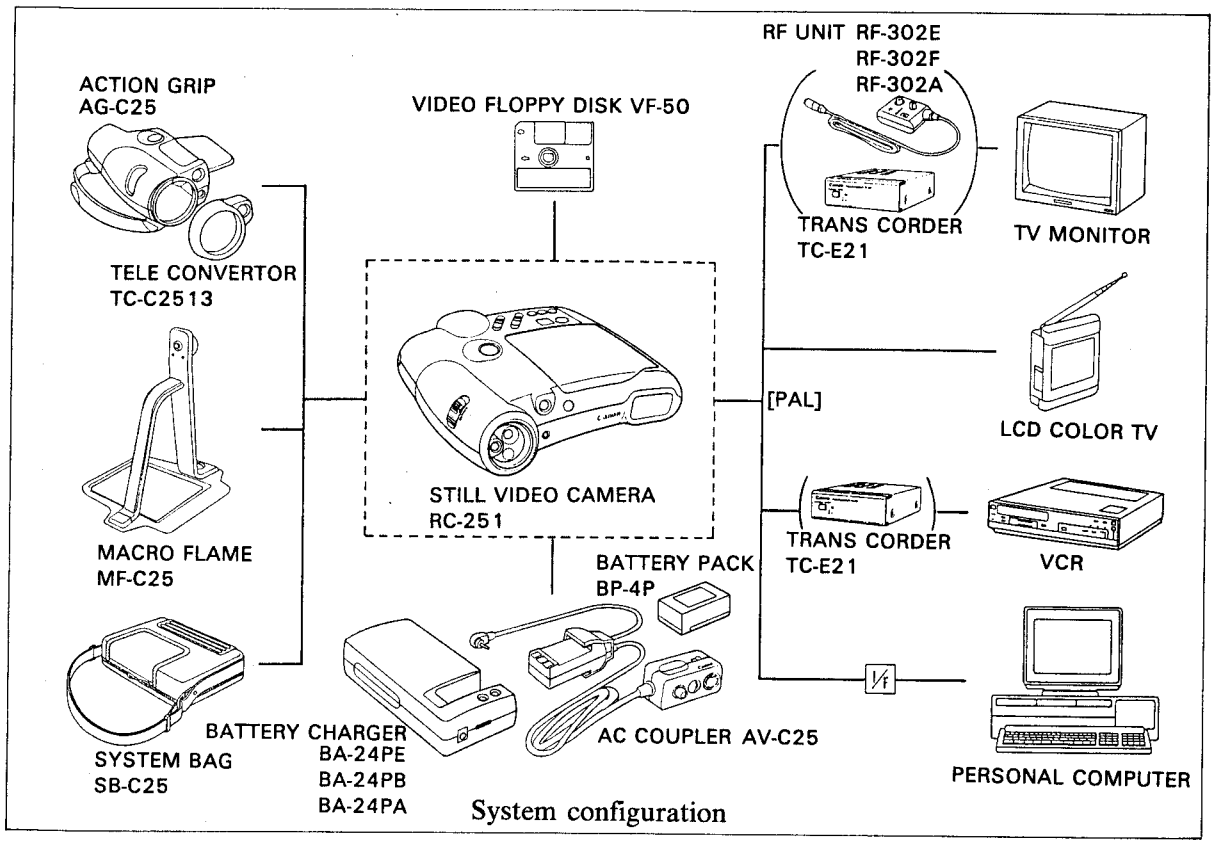
Pin No. 17. Video ground
20. Video output (1 V/75 Ω)

Pin Nos. 1 through 5 are dummy pins for reinforcing connection

Layout and functions of SCART connector pins

2. PRODUCT OUTLINE

2-1. System Configuration



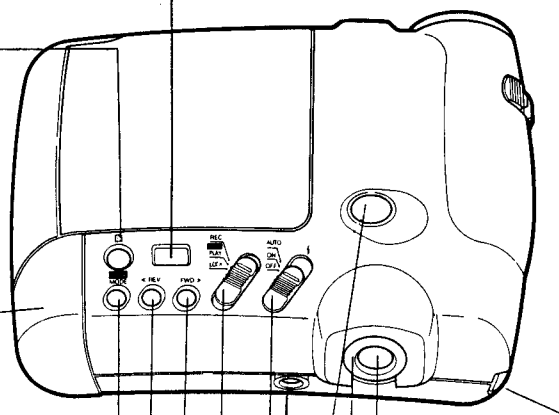
System configuration

2-2. Features

1) Equipped with recording, playback and erasing functions
2) Small and light
3) Macro photographing function
4) Simple operation
5) Innovative design
6) Built-in automatic light adjusting flash
7) Use of rechargeable Lead-acid battery
8) Dual control by main MPU and sub MPU
9) 1/2-inch, full-frame transfer type CCD for the SV camera
10) Ultra small shutter comprising 1 motor and 1 magnet
11) Thin disk drive unit
12) Metal-in-gap (MIG) head
13) Original erasing method using a low frequency attenuating signal
14) Highly reliable packaging
15) Feed back AE
16) Intelligent auto white balance
17) Luminance signal level compensation circuity for high saturation areas.
18) High-band recording with high picture quality

3. PART NAMES

3-1. External Parts



Self timer photographing display

Battery condition display

1 picture photographing mode display

Continuous photographing mode display

- Liquipd crystal dsiplay panels

Track number display
Video floppy status display
- Not loaded
- Record prohibit floppy loaded
- Photographing completed on all tracks

Battery replacement display
Error display

- Exposure compensation button
When photographing with back-lighting, photographs are taken by pressing the shutter button while also pressing this button.
(Exposure compensation +1.5)
When use flash photographing.
(Exposure compensation −1.0)

- Battery cover

- Photographing mode button
When photographing, 1 picture photographing, continuous photographing (3 pictures/second), or self timer photographing is set.
When in the erasing mode, the pictures being playback are erased if the shutter button is on the second level (SW2 ON) while pressing this button.

- Reverse button
When in the playback mode, the pictures on the track one number smaller are played each time this button is pressed. When photographing by random access, the head moves in the direction of the smaller track numbers to an empty track if the shutter button is at the first level (SW1 ON) while pressing this button.

- Forward button
When in the playback mode, the pictures on the track one number larger are played each time this button is pressed. When photographing by random access, the head moves in the direction of the larger track numbers to an empty track if the shutter button is at the first level (SW1 ON) while pressing this button.

- Strap attachment

- View finder

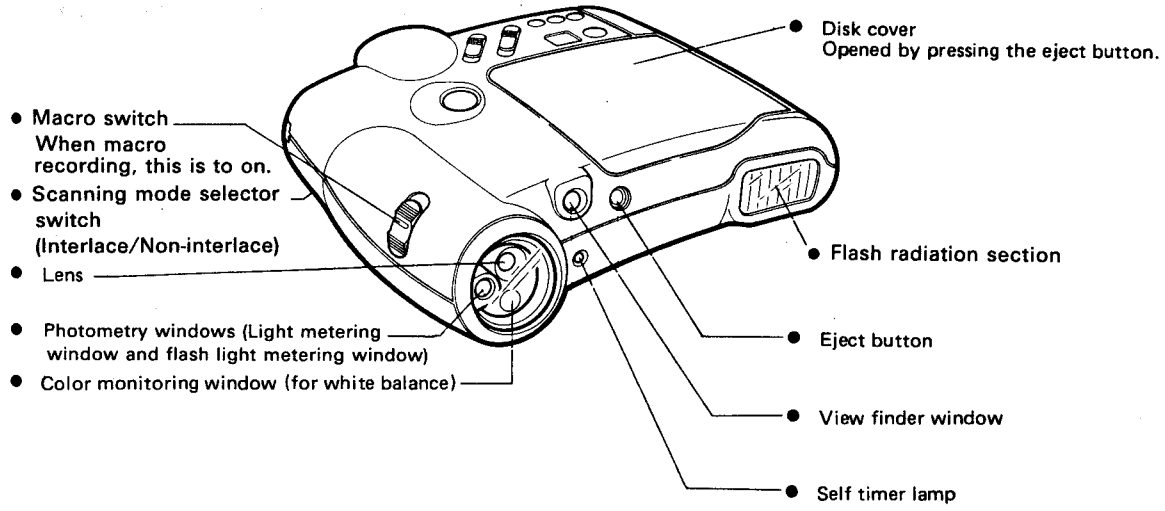
- Diopter adjustment ring

- Shutter button
When on at the first level (SW1 ON), the floppy starts rotating while the light metering and color monitoring take effect. When recording with the flash, the flash starts being charged with the shutter at the first level. When recording by random access, the head can be moved to an empty track if the shutter is on at the first level while pressing the forward button or reverse button.
Recording with the shutter on at the second level (SW2 ON).
When erasing, the pictures being playback are erased if the shutter is on at the second level while pressing the recording mode button.

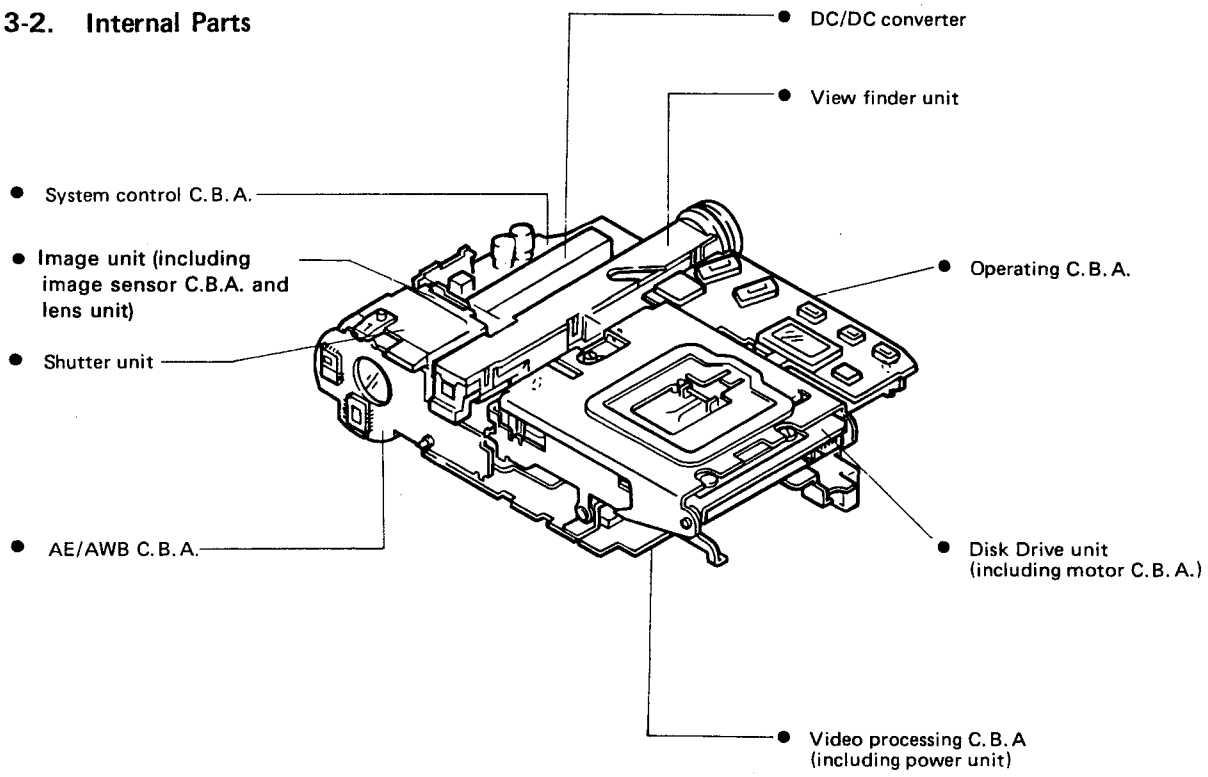
- Video signal output terminal
(φ2.5mm mini jack)

- Flash mode switch

- Main switch
The recording, erasing or playback mode is set.
If st to [LOCK], the power goes off.

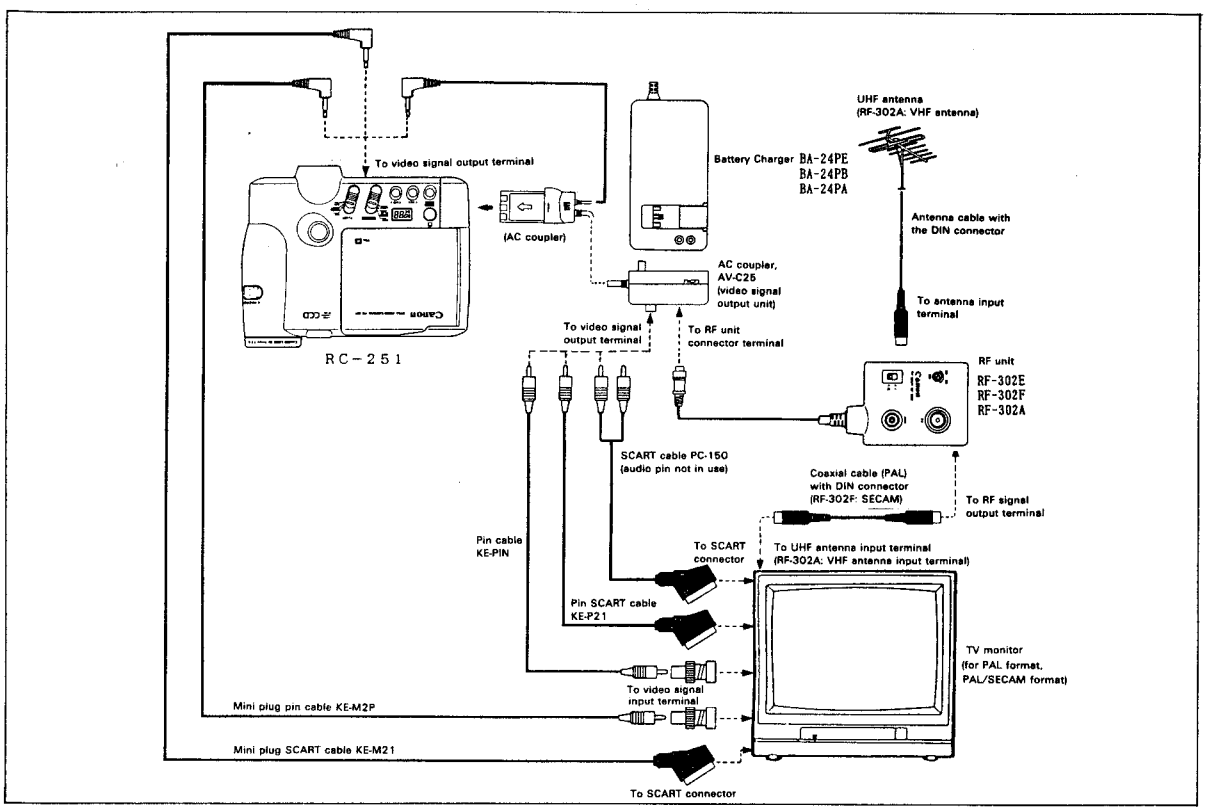


3-2. Internal Parts

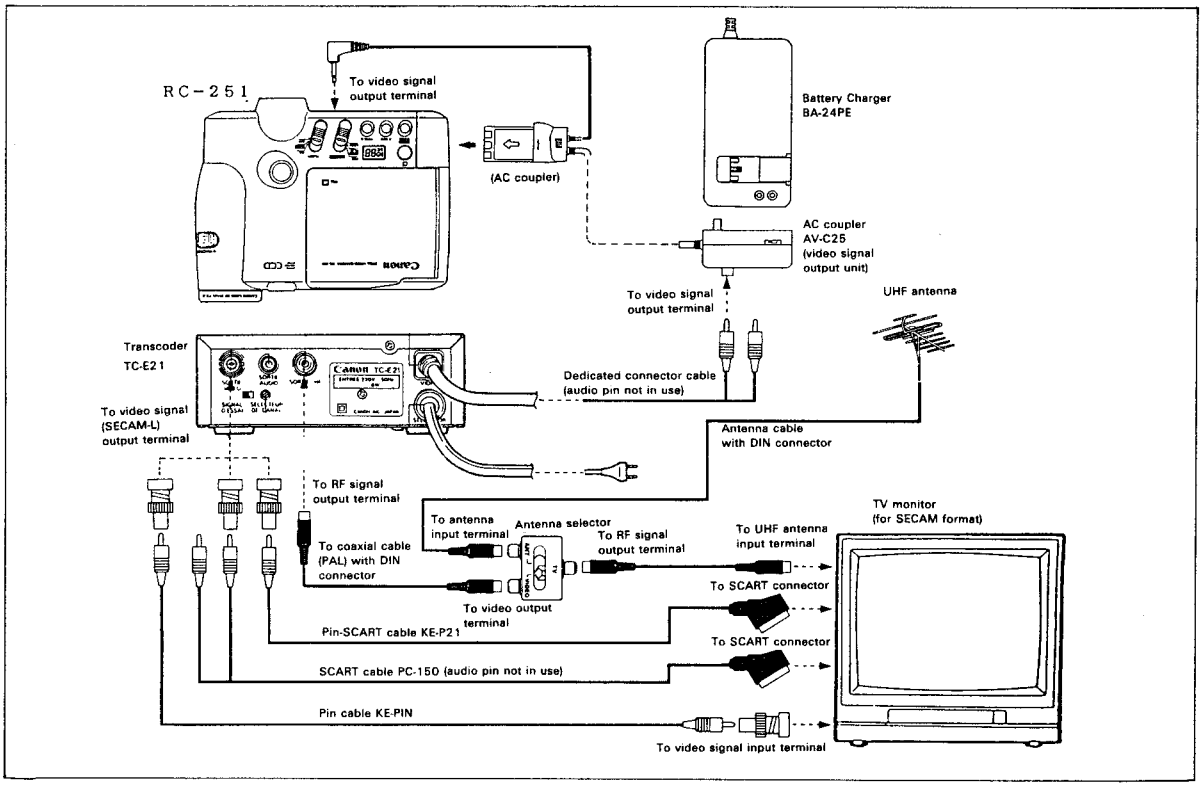


4. CONNECTION DIAGRAMS

4-1. Connection Diagram for PAL Format


UHF antenna
(RF-302A: VHF antenna)
Battery Charger BA-24PE
BA-24PB
BA-24PA
To video signal output terminal
(AC coupler)
Antenna cable with the DIN connector
AC coupler, AV-C25 (video signal output unit)
To antenna input terminal
To video signal output terminal
To RF unit connector terminal
RC-251
RF unit
RF-302E
RF-302F
RF-302A
SCART cable PC-150 (audio pin not in use)
Coaxial cable (PAL) with DIN connector (RF-302F: SECAM)
To RF signal output terminal
Pin cable KE-PIN
To SCART connector
To UHF antenna input terminal (RF-302A: VHF antenna input terminal)
Pin SCART cable KE-P21
TV monitor (for PAL format, PAL/SECAM format)
To video signal input terminal
Mini plug pin cable KE-M2P
Mini plug SCART cable KE-M21
To SCART connector

4-2. Connection Diagram for SECAM Format


RC-251
To video signal output terminal
(AC coupler)
Battery Charger BA-24PE
AC coupler AV-C25 (video signal output unit)
To video signal output terminal
UHF antenna
Transcoder TC-E21
Dedicated connector cable (audio pin not in use)
To video signal (SECAM-L) output terminal
Antenna cable with DIN connector
To RF signal output terminal
To antenna input terminal
Antenna selector
To RF signal output terminal
To UHF antenna input terminal
TV monitor (for SECAM format)
To coaxial cable (PAL) with DIN connector
To SCART connector
To video output terminal
Pin-SCART cable KE-P21
To SCART connector
SCART cable PC-150 (audio pin not in use)
Pin cable KE-PIN
To video signal input terminal

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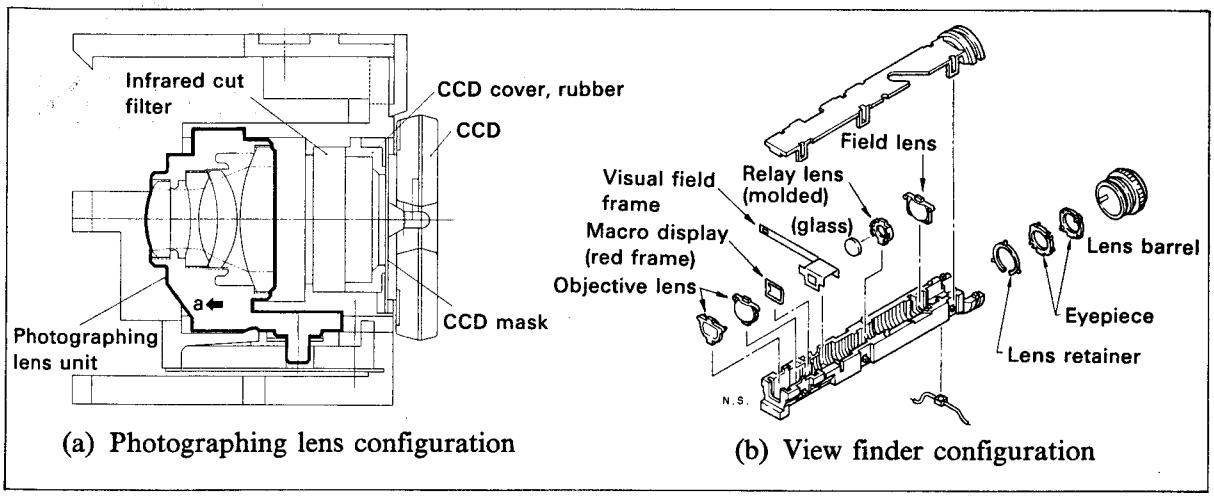
1. MECHANISMS

1-1. Optical system



(a) Photographing lens configuration

(b) View finder configuration

(1) Photographing lens

The above figure (a) shows the configuration of the photographing lens optical system. Adopting the front-focusing type optical system for the photographing lens, the RC-251 uses the minimum necessary space for the shutter mechanism, shortens the flange back and thereby achieves an ultracompact photographing system.

To set the macro mechanism for macro photography, the photographing lens unit advances by 0.40 mm in the direction of arrow a.

The major specifications of the photographing lens optical system are as follows:

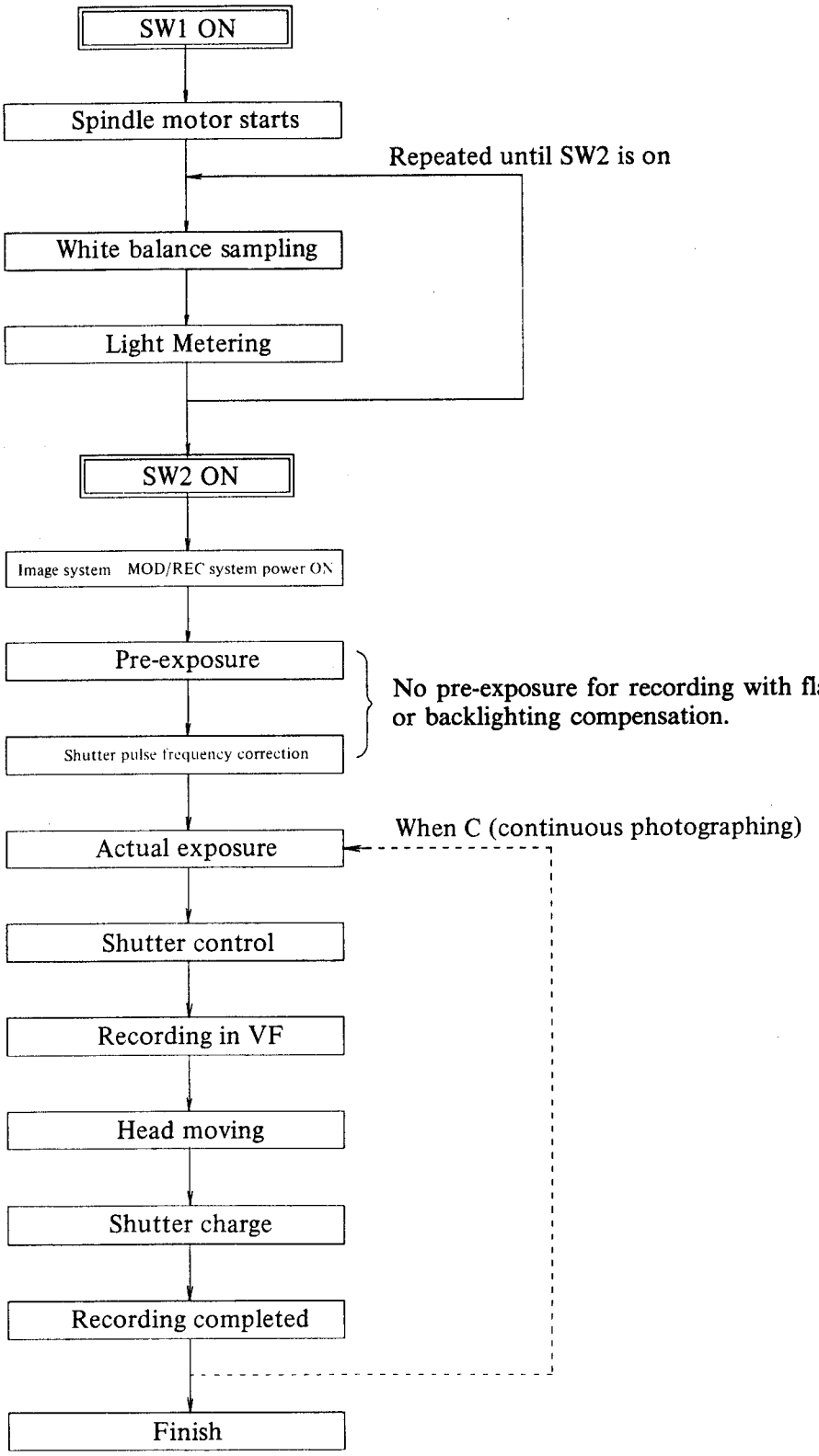
1)	Focusing distance	11 mm (equivalent to 60 mm on 35 mm camera)
2)	F No.	F2.8
3)	Lens configuration	4 groups, 4 lenses
4)	Depth of field	F2.91: 0.914 m ~ ∞
		F4 : 0.765 m ~ ∞
		F8 : 0.479 m ~ ∞
		F16 : 0.274 m ~ ∞
		F22 : 0.207 m ~ ∞

(2) View finder

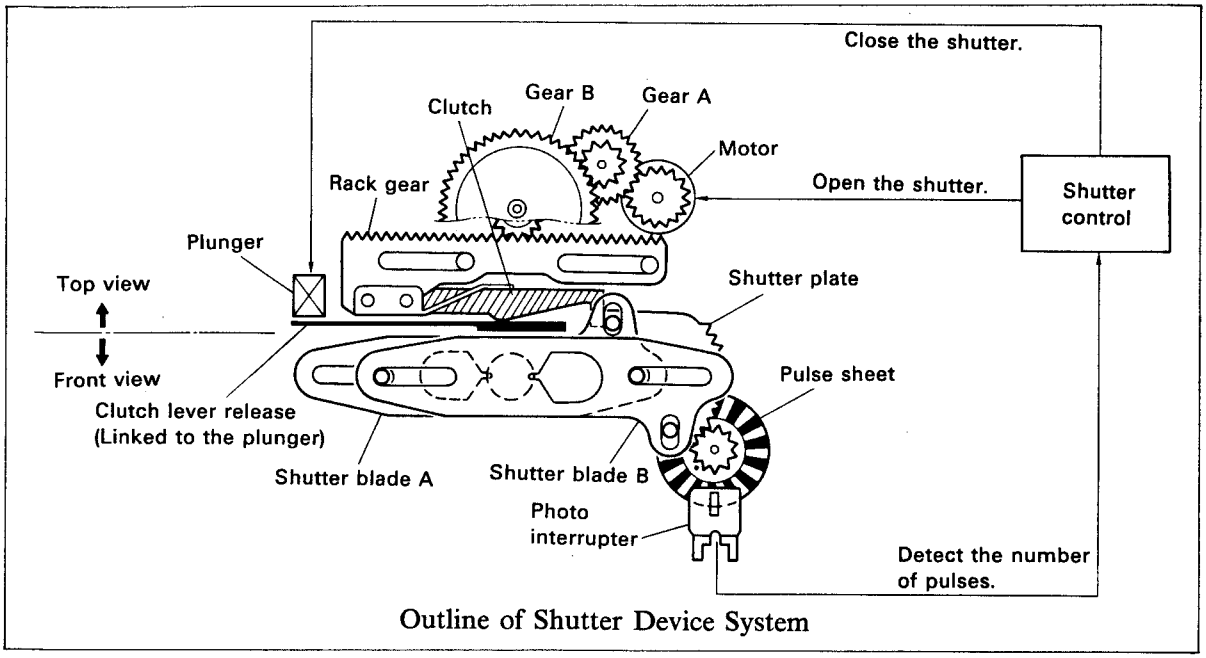
Figure (b) shows the configuration of the view finder. The Albada finder or the inverse-Galilean finder suited to the conventional cameras are too large for the thin RC-251. The RC-251 is therefore equipped with a real-image type, secondary image formation view finder shown in the above figure (b), This view finder matches well with the thin and compact camera body.

1-2. Exposure Mechanism

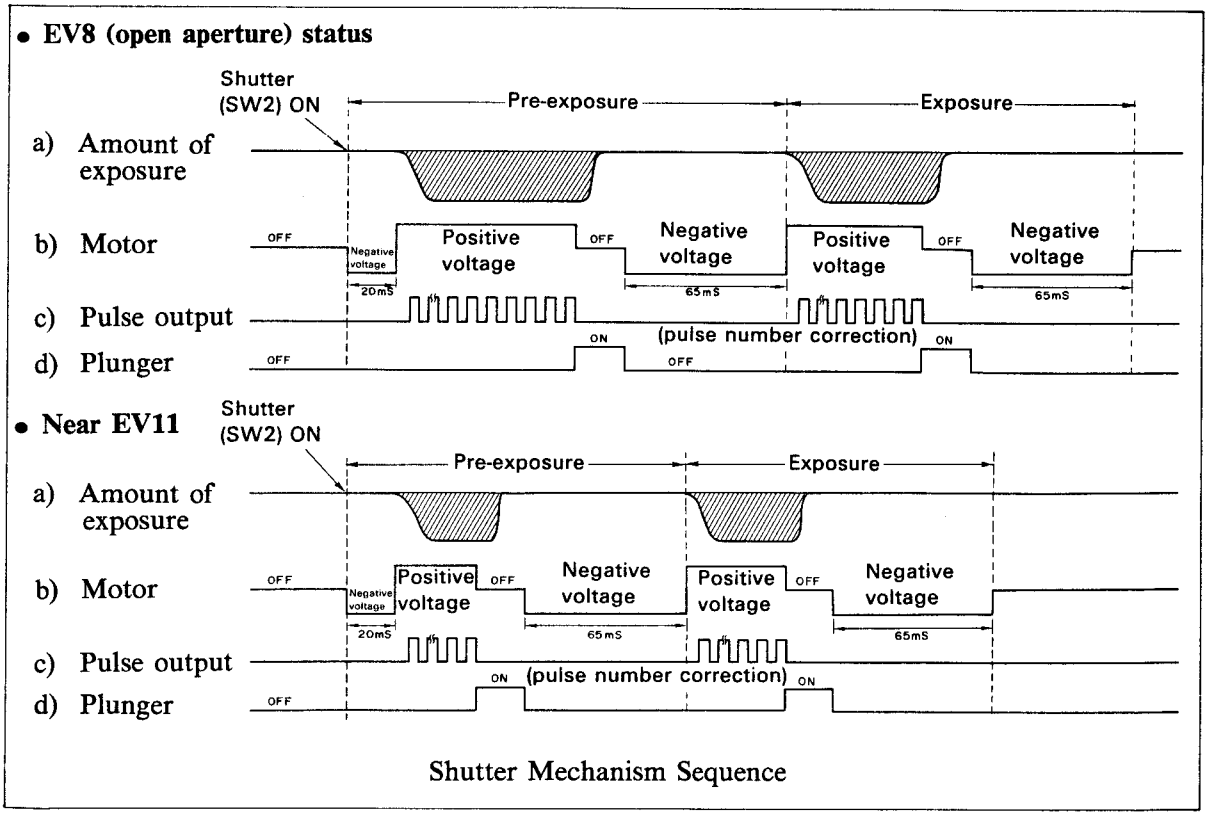
(1) Movement flow chart when recording



(2) Shutter mechanism



Outline of Shutter Device System



Shutter Mechanism Sequence

The above figures show the shutter drive mechanism and the sequence of the shutter mechanism.

The two-blade programmed shutter equipped with one motor and one magnet has achieved a compact body and drastic reduction in cost. A pulse sheet is provided to improve shutter accuracy, and it rotates, interlocking with the shutter blade movement. With this pulse sheet, the photo interrupter counts the number of pulses and detects the position of the shutter blades in motion. In addition, a simplified servo circuit is added to drive the shutter driving motor to cope with supply voltage fluctuation.

The following describes the shutter unit operation step by step.

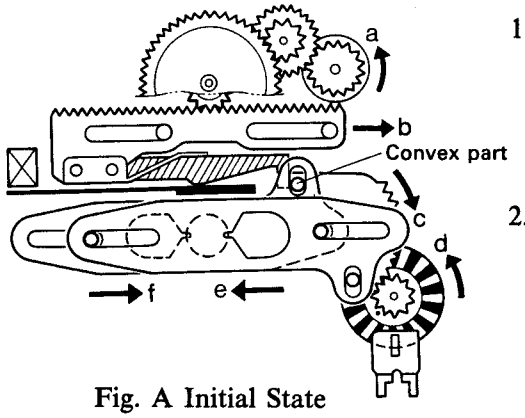


Fig. A Initial State

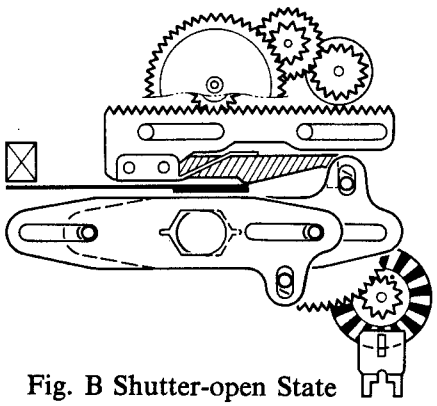


Fig. B Shutter-open State

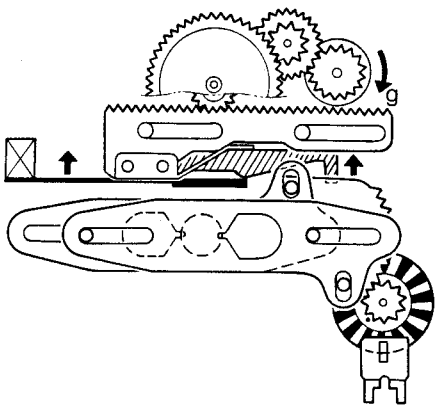


Fig. C Plunger-ON state (shutter close)

1. Pressing the shutter button turns the motor counterclockwise (arrow a) for pre-exposure. Motor rotation transmitted via gears A and B moves the rack plate left to right (arrow b). (Fig. A)

2. At the same time, the clutch incorporated in the rack plate starts moving to press the convex part of the shutter plate, turning the shutter plate and the pulse sheet in the directions of arrows c and d, respectively. (Fig. A)

3. When the shutter plate rotates, shutter blades A and B slide in the opposite directions (arrows e and f) to open the shutter. (Fig. A to Fig. B)

4. The main MPU converts the exposure detected by the AE sensor to the number of pulses. When this number agrees with the number of pulses counted by the photo interrupter using the pulse sheet, the main MPU turns on the plunger. (Fig. B to Fig. C)

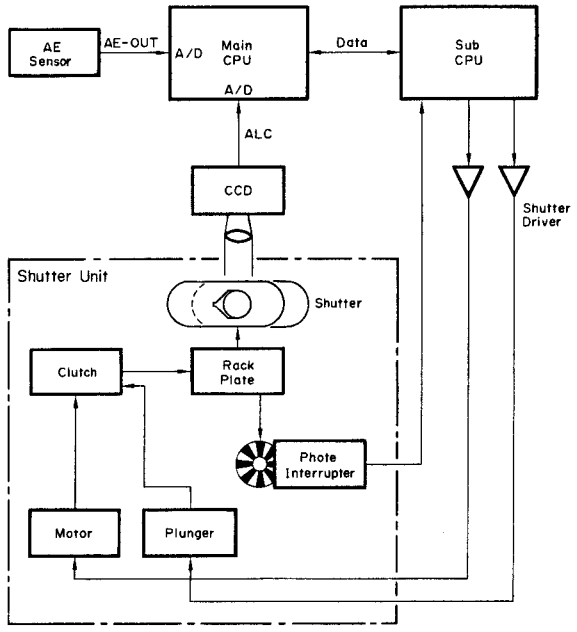
5. Activating the plunger causes the clutch release lever to press the clutch, which then causes the shutter plate to come off the convex part. (Fig. C)

6. The pulse sheet and the shutter plate return to their initial positions by the force of the spring attached to the pulse sheet shaft. The shutter blades interlocking with the shutter plate also return to their home positions. (Fig. C)

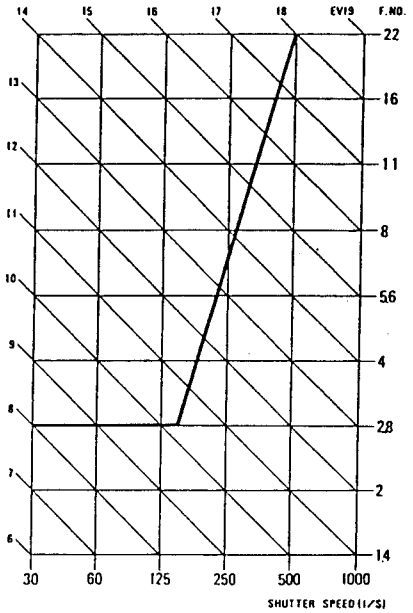
7. The main MPU turns off the plunger and turns the motor clockwise (arrow g) to set the rack plate back to the initial position. (Pre-exposure is completed) (Fig. C to Fig. A).

8. The main MPU also compensate the number of pulses based upon the exposure detected by the CCD during pre-exposure. Then, it repeats the same operation, this time, for exposure. (Fig. A to Fig. C)

(3) Exposure control



(a) Feedback AE Operation



(b) AE characteristics

As the dynamic range of the CCD image sensor is narrower than the latitude of the 35 mm film, exposure errors have great influence on the image quality. The RC-251 adopts a photometric system called feedback AE. This system exercises highly precise exposure control so that the optimum exposure can be obtained even in a narrow dynamic range.

When a high luminance spot is in the upper part of the picture, exposure of the main subject becomes inadequate. To prevent this problem, the photometric area of feedback AE is set at about lower 2/3 part of the CCD.

The following describes the feedback AE operation step by step.

1. The main MPU reads the AE sensor (SPC) output after performing A/D conversion, then converts it to the EV value.
2. The main MPU converts the EV value to the number of pulses which determine the shutter blade movement and the delay time of the shutter blades. Then, it sends this data to the sub MPU.
3. The sub MPU drives the shutter mechanism via the shutter driver to obtain the specified EV value, then conducts pre-exposure for the CCD.
4. The main MPU reads the luminance signal output by the CCD after A/D conversion and, if necessary, compensate the shutter speed (number of pulses) to optimize exposure.
5. The main MPU converts the reset EV value to the number of pulses and the delay time, then sends this data to the sub MPU.
6. By driving the shutter mechanism again, the sub MPU conducts exposure for the CCD.

(4) Automatic Light Adjusting Flash

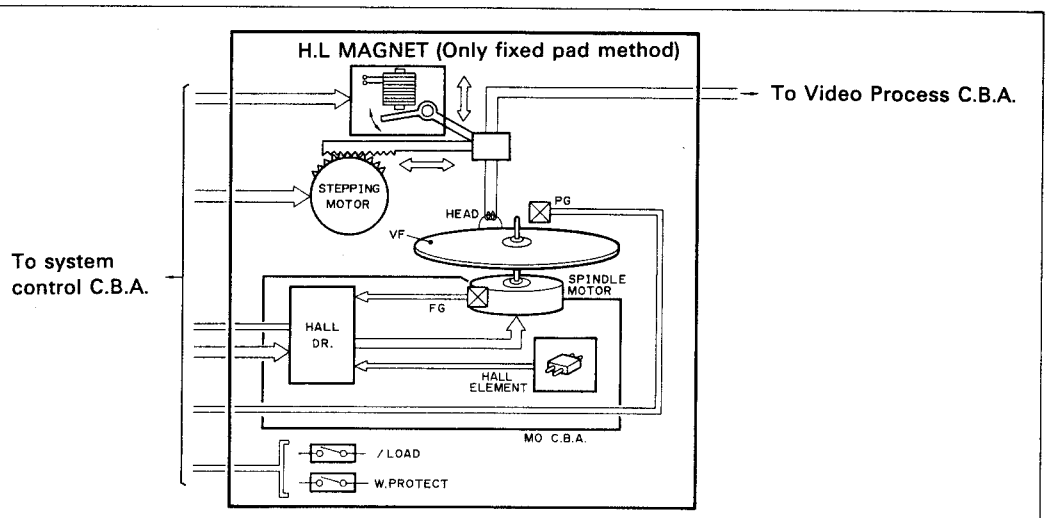
With the SV camera the latitude of the CCD is extremely narrow compared with that of the 35mm film. So in the interests of precision it is not possible to employ the light adjustment method used for the normal 35mm compact camera (where the amount of radiation for the flash is practically fixed and the Aperture opening is determined based on the distance data obtained). For the RC-251, therefore, a system for varying the amount of radiation has been adopted to ensure highly accurate light adjustment. In order to restrain the voltage during radiation, moreover, an ultra thin flash lamp is used, while the circuit current when charging the condenser has been reduced to diminish the load applied to the battery.

Below is indicated the sequence for the automatic light adjustment operation.

1. When the outdoor daylight is below EV8 and the flash switch is on the auto mode, the charging starts simultaneously with SW1 being turned on.
2. When the charging voltage reaches over 220V and SW2 is turned on, the shutter opens, and upon the pulse frequency reaching the appropriate level, the radiation commences.
3. The reflected light from the subject is detected by the EF sensor and sent to the main MPU.
4. When the appropriate exposure is achieved, the main MPU outputs the signal for stopping the radiation.
5. The radiation stops and the shutter closes to complete the recording.

1-3. Disk Drive Mechanism

(1) Configuration of the disk drive unit

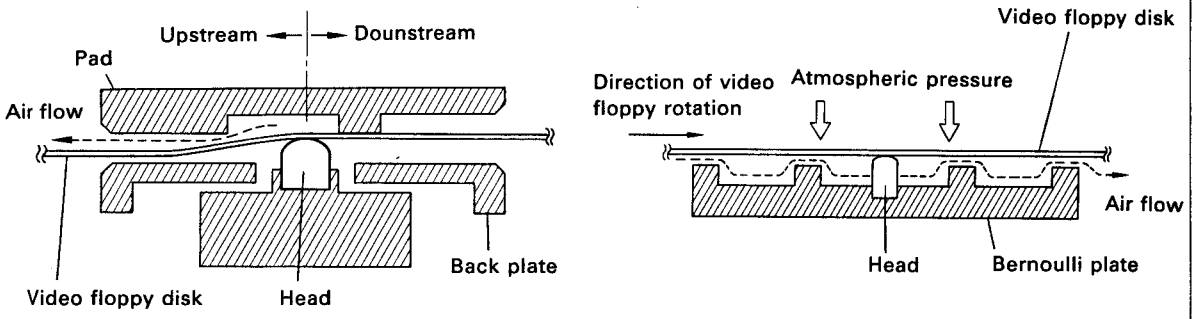


Principles of disk drive unit

The workings of each part are indicated below based on the diagram showing the principles of the disk drive unit.

- Spindle motor :The motor for rotating the video floppy 3,000 times in 1 minute.
- Stepping motor :The motor for rotating by degrees at a fixed angle and positioning the head correctly.
- FG :The signal generator for controlling the spindle motor rotation.
- PG :The signal generator which indicates the starting position for recording into the video floppy VF.
- Head :For recording the video signal in the VF or reading it out from the VF.
- Hall element :For detecting the phase of the spindle motor.
- Load switch :For detecting whether the video floppy is in position.
- Write protect switch :For detecting whether the tab for preventing mistaken erasing is broken.
- Head load magnet (Only fixed pad method) :For bringing the head in contact with the video flopply.

(2) Head loading



Fixed pad method　　Bernoulli plate method

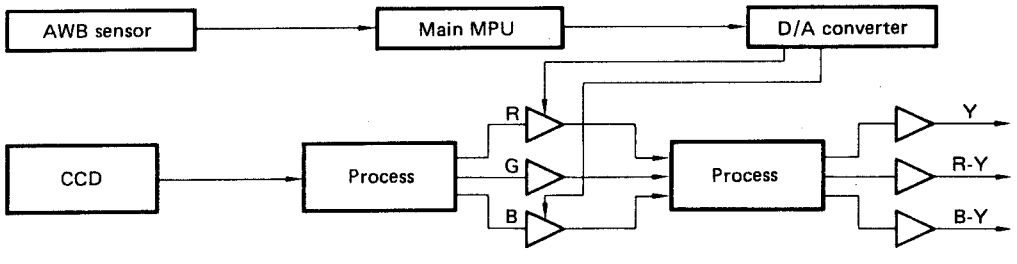
Regarding the disk drive, minimizing the spacing loss of the magnetic head and floppy disk is an essential condition for obtaining a good "head touch", that is, for maintaining a high picture quality.

Currently, the methods for minimizing this spacing loss can be broadly divided into the following two types. Further, there is no difference in picture quality between these methods.

- Fixed pad method
  In the fixed pad method, a fixed pad is located at the opposite side from the magnetic head of the floppy disk inserted, and as the floppy disk rotates at high speed, it creates air pressure which pushes the floppy disk toward the magnetic head.
- Bernoulli plate method
  In the Bernoulli plate method, a double circular-type Bernoulli plate is arranged around the magnetic head. When the floppy disk rotates, air flows and a vacuum is generated between the plate and the floppy disk. As a result, the floppy disk is pushed toward the Bernoulli plate by the atmospheric pressure to cause contact with the head.

In this device RC-251, 2 types of disk drive units have been installed, for the fixed pad method in existing products, and the Bernoulli plate method, which is expected to be developed in the future.

1-4. AWB Circuit

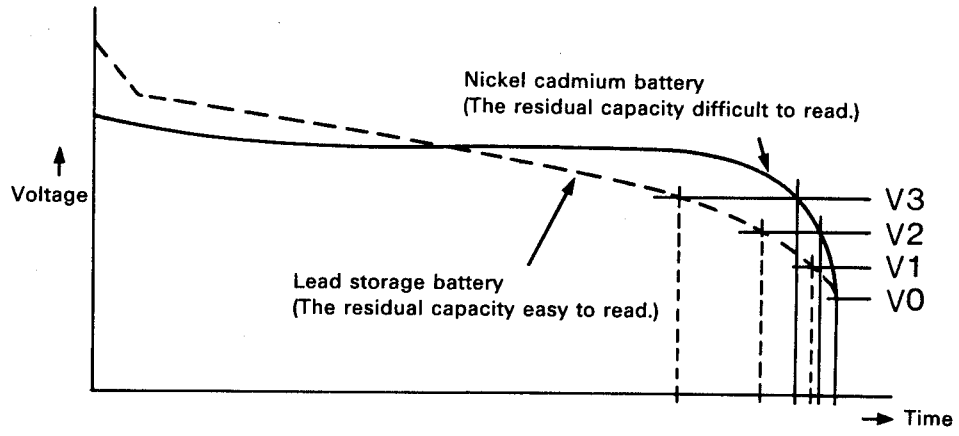


AWB principle

For the AWB IC the R, G and B color filters on the sensor surface have been placed radially on chips, and the surface, number of divisions and arrangement of each filter have been devised so that the spectral diffraction characteristics of the filters accord with those for the CCD.

As for the system control circuit, when the light source color is found with the AWB sensor, the gain for the R, G and B signals of the image circuit due to this light source color is controlled by the signals going through the D/A converter. Moreover, in order to prevent any effects from the flickering of fluorescent lights, sampling is done 31 times per 100ms and averaged out, so that there is no effect in the case of either 50Hz or 60Hz.

1-5. Lead Storage Battery



Voltage and Battery Residual Capacity

The rechargeable lead storage battery can be constructed smaller than the nickel cadmium battery, so it is suited to a thinner and more compact camera body. In addition, the voltage of the rechargeable lead storage battery lowers gradually as the battery discharges more electricity. The nickel cadmium battery, on the other hand, maintains a constant voltage right up to the moment of complete discharging. This means it is easier with the lead acid battery to indicate the residual capacity.

As a basic rule, the lead storage battery must be recharged after each use because it is vulnerable to excessive discharging. When the battery is kept in storage for a long time, it should be charged at least every 6 months.

The lead storage battery has the following characteristics.

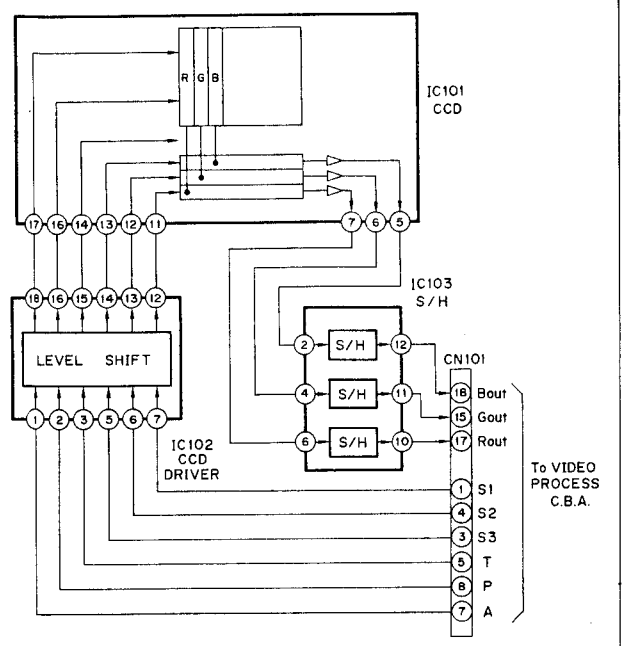
1) Having a large nominal capacity per unit volume, the battery can discharge a large current for a prolonged period of time.
2) The battery can be recharged for repeated use, so the running cost is low.
3) Little self-discharging
4) The voltage characteristics deteriorate gradually during discharging (see the figure above).
5) Vulnerable to excess discharging
6) Performance deteriorates at low temperature.

2. EXPLANATION OF CIRCUITS

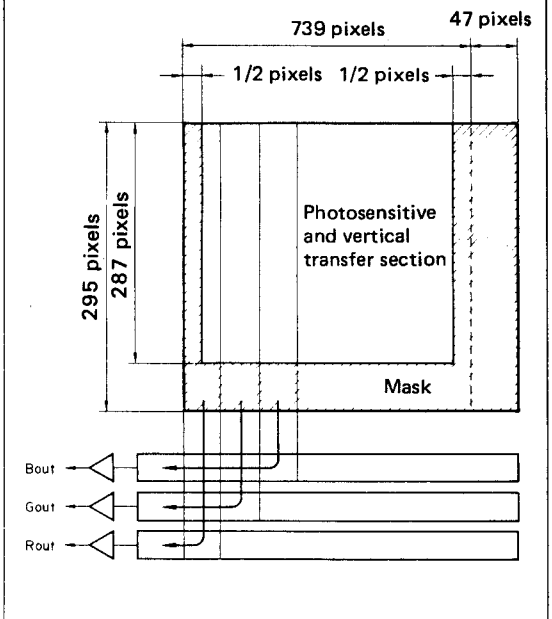
An explanation is given for each block.

As space does not allow in this manual, please see the "Still Video System Basic (Electrical Edition)" for the basics.

2-1. Image Sensor C.B.A.



Block diagram of image sensor C.B.A. unit



CCD configuration

(1) CCD (Charge Coupled Device)

For the RC-251 a newly developed frame transfer type of CCD with no accumulating section is used, allowing for reduced cost and a simplified circuit (see the showing the CCD configuration).

Below are indicated the specifications for the CCD.

Transmission method	:Full frame transfer
Construction	:Single virtual phase drive
Image size	:6.4mm (H) × 4.8mm (V) [equivalent to 1/2 inch size]
Total number of pixels	:230,000 [786 (H) × 295 (V)]
Effective number of pixels	:210,000 [739 (H) × 287 (V)]
Coloring method	:R, G, B pure color stripe filter (on chip type)

Because with the still video camera the movie mode is necessary for outputting image signals continuously, the accumulating section has been eliminated from the frame transfer type CCD.

The electric charge photoelectrically converted by each pixel is transmitted vertically line by line by the ϕP pulse output from IC102 ⑯ pin (transmission frequency: 15.73KHz).

The vertically transmitted electric charge is parallel/serial converted by the ϕT pulse output from IC102 ⑮ pin, and sent to the horizontal transmission section (transmission frequency: 15.73KHz).

Having been parallel/serial converted and sent to the horizontal transmission section, the electric charge is sent to the output section by the ϕS1 – ϕS3 pulses output from IC102 ⑫ – ⑭ Pins.

The output section comprises a correlated double sample circuit. With this the low frequency noise is excluded due to difference in the levels of the high frequency noise characteristics of the CCD pulse and the image signal, thus improving the SN ratio.

The IC102 ⑱ pin output ϕAB is the brooming control pulse added during vertical transmission to prevent the electric charge from overflowing when there is too much light incidence in the CCD.

(2) CCD Driver

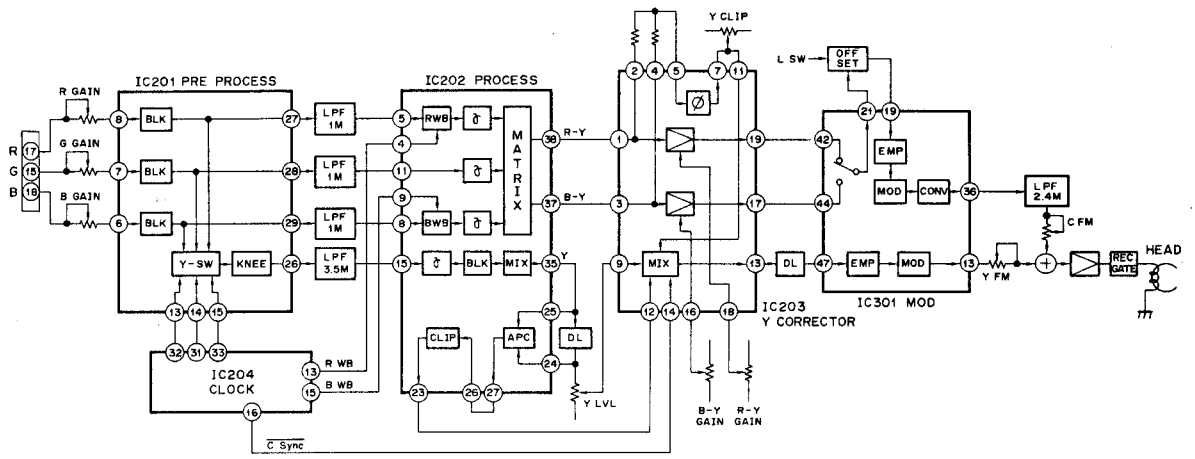
The CCD driver levels out the pulse signals for controlling the CCD coming from IC204 (clock IC) of the video process C.B.A, and outputs them as signals for actually driving the CCD.

(3) Sample hold Circuit (S/H)

As the image signals output by the CCD are in pulse form, they are output as continuous image signals by means of the SHR, SHG and SHB signals form IC204 (clock IC) of the video process C.B.A. using the sample hold circuit.

2-2. Video Process C.B.A.

2-2-1. Recording system



Block diagram of video process C.B.A. (recording system)

(1) Luminance signal generating circuit

The image signals from the image sensor C.B.A. (R, G, B signals) are passed through the gain adjustment VR and input respectively into IC201 pins ⑥, ⑦ and ⑧.

At IC201 the high band Luminance signals are extracted from the R, G and B signals by means of the switch pulse input to pins ⑬, ⑭ and ⑮, and output to pin ㉖.

The Luminance signals are passed through the LPF (3.5MHz) and input IC202 pin ⑮ where they are gamma compensated. With the addition of the blanking signals they are then output to pin ㉟.

At IC203 the Luminance signals input to pin ⑨, the outline emphasis signals input to pin ⑫, the compound synchronous signals (C Sync) input from IC204 to pin ⑭, and the Luminance compensation signals from the color differential signals input to pin ⑪ are synthesized and output form pin ⑬.

(2) Color differential signal generation circuit

The R, G and B signals input to IC201 pins ⑥, ⑦ and ⑧ are, with the addition of the blanking signals, output from pins ㉗, ㉘ and ㉙, then passed through the LPF (1MHz) and input to IC202 pins ⑤, ⑧ and ⑪.

For the R and B signals input by pins ⑤ and ⑧, the gain is adjusted and the white balance removed by the RWB and BWB signals input to pins ④ and ⑨ from IC204.

The R, G, and B signals are gamma compensated and input to the matrix circuit. Then they are output from IC202 pins ㊲ and ㊳ as color differential signals R-Y and B-Y.

(3) FM modulation circuit

To compensate for the time difference with the color differential signals, the luminance signals are passed through a delay line and then input to IC301 pin ⑰. With the non-linear emphasis added and having been FM modulated, they are output from pin ⑬.

On the other hand, the color differential signals are input to IC301 pins ⑫ and ⑭ and made into color differential line sequential signals by means of a which changes over every 1H.

The color differential line sequential signals are output from pin ㉑, and in order for R-Y to be 1.2MHz and B-Y to be 1.3MHz during FM modulation in the offset circuit, a DC potential difference is applied for R-Y and B-Y.

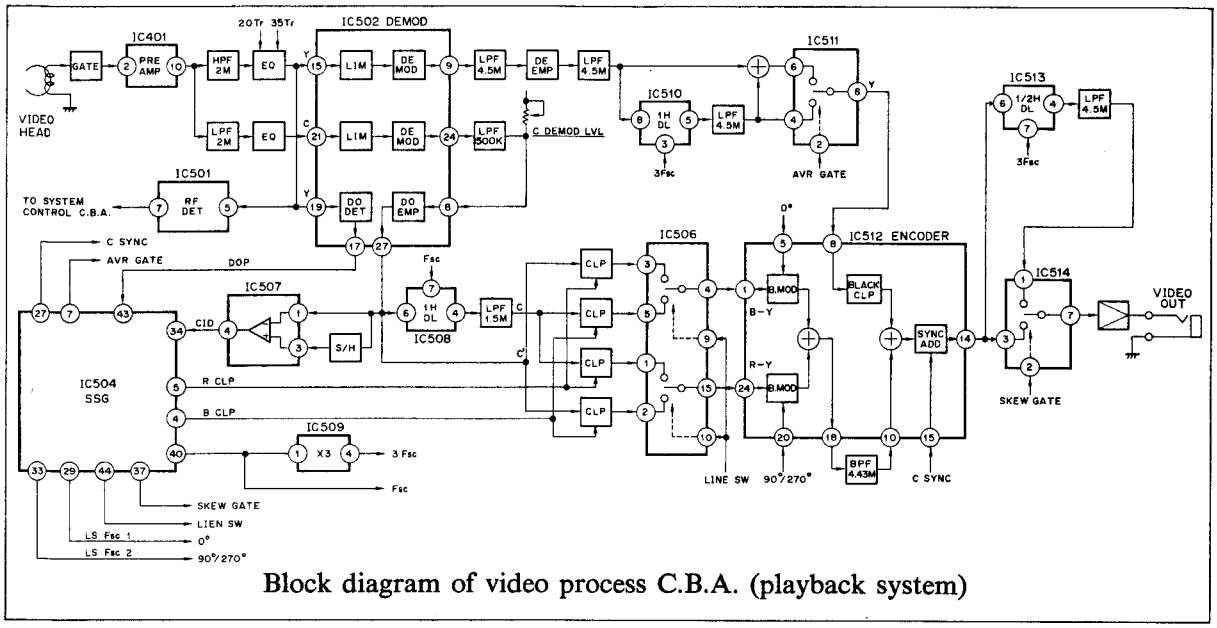
Then they are again input to IC301 pin ⑲, where they are given non-linear emphasis and FM modulated. However, the modulation central frequencies at this time are 4.78MHz for R-Y and 4.88MHz for B-Y. So in the next conversion circuit 3.58MHz are deducted from the modulation signals and they are output from pin ㊱ with R-Y equaling 1.2MHz and B-Y equaling 1.3MHz. This conversion circuit is for preventing the generation of heat noise due to distortion during modulation.

(4) Recording amplification circuit

The FM modulated Luminance FM signals (Y FM) and color differential FM signals (C FM) are each leveled out and synthesized by the VR.

Having then been amplified by the recording amplifier, these synthesized signals are passed through the REC gate and output to the video head.

2-2-2. Playback system



Block diagram of video process C.B.A. (playback system)

(1) Luminance signal demodulation circuit

Playback RF signals from the video head pass through the pre-amplifier IC401, then the HPF (2 MHz) extracts only the luminance signal components.

After high-frequency parts are corrected by the equalizer circuit, the luminance RF signals are input to pins ⑮ and ⑲ of IC502. Signals input to pin ⑲ are detected, and drop out pulses are sent to SSG of IC504 (though the RC-251 detects drop out, it does not supplement the video signals).

Signals input to pin ⑮ are demodulated by the limiter, then output from pin ⑨.

The demodulated luminance signals pass through the LPF (4.5 MHz) for eliminating high-frequency noise components, then they are sent to the deemphasis circuit. The deemphasis circuit recovers the original form of the high-frequency part corrected during recording. Then, the signals pass through the LPF (4.5 MHz) again. They are sent to the line interpolation circuit after correcting the time difference with the color differential signals. In the line interpolation circuit, the luminance signals are separated into two groups to generate signals for the second field. One group is delayed for 1H by IC510, passed through the LPF (4.5 MHz), then input to pin ④ of IC511. The other group is synthesized with 1H-delayed signals, then input to pin ⑥ of IC 511.

The two types of signals are switched at 1V intervals by the switching IC of IC511 according to the interpolation gate pulse. The 1H-delayed signal and the interpolation signal are switched in the interlace mode while the 1H-delayed signal is selected and input to pin ⑧ of IC512 in the non-interlace mode.

(2) Color differential signal demodulation circuit

RF signals from IC401 pass through the LPF (2 MHz) for extracting only the color differential signal components. The color differential signals are then input via the equalizer circuit to pin ㉑ of IC502.

The color differential RF signals are demodulated by the limiter, then output to pin ㉔. After level adjustment by the VR, the signals are returned to pin ⑧, deemphasized and output from pin ㉗.

The R-Y and B-Y lines of color differential signals are identified by input to pins ① and ③ of IC507. Then, these signals (CID signals) are sent to SSG of IC504.

The signals from pin ㉗ of IC502 are separated into two groups. One group is delayed for 1H by IC508, fed through the LPF (1.5 MHz), then input to the clamp circuit. The other signal is input directly to the clamp circuit. In the clamp circuit, offset levels are eliminated by RCLP and BCLP signals from IC504 (SSG IC).

The clamp circuit inputs color differential signals to the switching IC of IC506. Then, the color differential signals are processed by the LINE SW control signal and input to pin ① (B-Y signals) and pin ㉔ (R-Y signals) of IC512.

The burst flag is added to each color differential signal input to IC512. B-Y signals go through balance modulation with a carrier wave signal (4.43 MHz) of phase 0°. R-Y signals go through balance modulation with a carrier wave signal of phases 90° and 270°, which are switched at 1H intervals. These signals are synthesized to become color signals.

Next, luminance signals from pin 8 are synthesized with color signals, then synthesized signals are output from pin ⑭ after the synchronization signals are changed.

(3) Skew compensation circuit

Video signals output from pin ⑭ of IC512 are separated into two groups. One group is input directly to pin ③ of IC514 while the other is delayed for 1/2H by IC513, passed through the LPF (4.5 MHz), then input to pin ① of IC514. The operation of the switching IC of IC514 differs between standard playback and non-interlace playback.

During standard playback, signals are switched at 1V intervals according to the skew gate pulse.

After skew compensation, these signals are output from pin ⑦.

During interlace playback, the signal is fixed to that directly input from pin ③, and is then output. (When changing synchronized signals of IC512, shift the V synchronous position 1/2H.)

Video signals output from pin ⑦ are sent via the buffer to the VIDEO OUT pin as PAL video signals.

2-2-3. Timing signal system

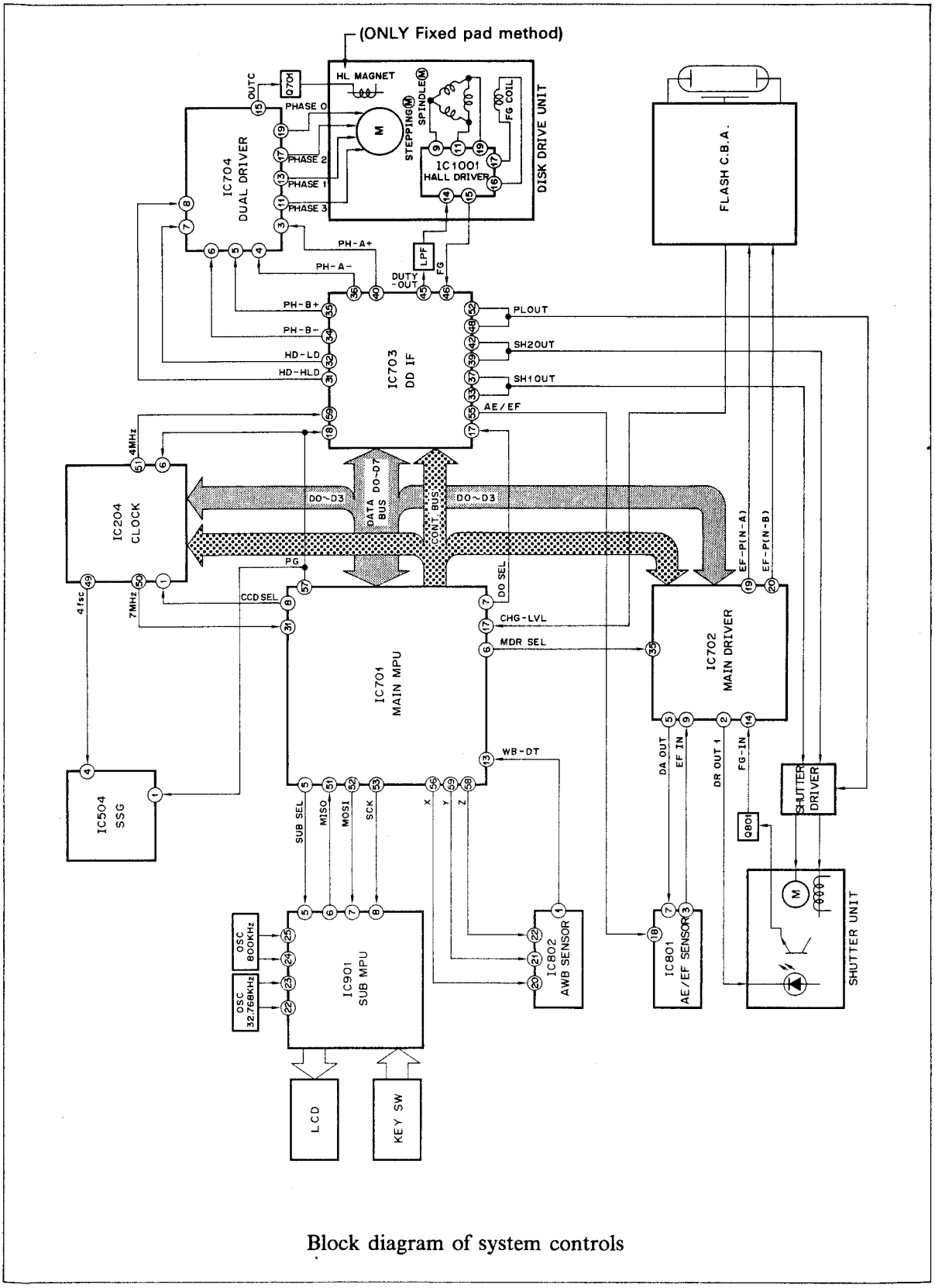
(1) Timing signal generating circuit

The timing signal generating circuit comprises a clock IC (IC204) and a signal generator (IC504). It produces timing signals necessary for the video signal processing circuit.

The clock IC (IC204) divides the input (28.4375 MHz) of the oscillator connected to pins ㊻ and ㊼, producing all the timing signals. It also supplies clock signals for the main MPU (7 MHZ) and the DD interface IC (4 MHz).

The SSG IC (IC504) divides the input (17.734476 MHz) of the oscillator connected to pins ⑫ and ⑬, producing a carrier signal of 4.43 MHz. It also generates control pulses necessary for the video signal.

2-3. System Control C.B.A.



Block diagram of system controls

(1) Main MPU (IC701)

The chief functions of the main MPU are indicated below.

- Communicates with the clock IC (IC204) of the video process C.B.A. by the control bus and data us (4 bit) lines, and controls the video signal processing circuit.
- Communicates with the main driver IC (IC702) by the control bus and data bus (4 bit) lines, and controls the regulator ICs for all the power sources.
- Communicates with the DD I/F (IC703) by the control bus and data bus (8 bit) lines, and controls the shutter unit and disk drive unit.
- Communicates with the sub MPU by means of pin ⑤① MISO signal input and pin ⑤② MOSI signal output, controls the LCD, and takes in the information for the key switches.
- Takes in from pin ⑬ the WB – DT signals originating from the AWB sensor (IC802), does the A/D conversion, and controls the image signal processing circuit for achieving the appropriate white balance.

(2) Main driver IC (IC702)

The chief functions of the main driver IC are indicated below.

- Takes in the EF IN signals from pin ③ of the AE/EF sensor (IC801), does the A/D conversion, and transmits them to the main MPU.
- Takes the signals from photo interrupter of the shutter unit with pin ⑭ and transmits them to the main MPU.
- Controls the flash.
- Controls the LED for the self timer.
- Controls all the system's power sources.

(3) DD interface IC (IC703)

The chief functions of the DD interface IC are indicated below.

- Controls the spindle motor by pin ④⑤ output which the pulse width modulation signals become a DC voltage in the LPF and are input to pin ⑭ of the Hall driver (IC1001). Also gives feedback with the FG signals of pin ④⑥.
- Controls the stepping motor by which the PH signals output from pins ③④ – ③⑥ and ④⓪ are input to the dual driver (IC704).
- Controls the motor and plunger of the shutter unit.

2-4. Operation C.B.A.

Operation C.B.A. comprises the operating switches, LCD and sub MPU. It receives the ON/OFF signals from the operating key switches and transmits them to IC701 (main MPU) by means of the MISO output from IC901 pin ⑥. It also controls the LCD by means of the MOSI input pin ⑦.

2-5. AE/AWB C.B.A.

(1) AE/EF sensor (IC801)

The AE/EF sensor changes the photometry during normal photographing and flash photographing with the AE/EF signals input to IC801 pin ⑱ , and outputs this photometric information from pin ③.

(2) AWB sensor (IC802)

Switches the output of the sensor to R/G or B/G using the X, Y AND Z signals input to pins ⑳ – ㉒ of IC802, and outputs this information from pin ①.

2-6. Flash C.B.A.

Charging the charging of the flash's condenser is started with the EF-P (N-A) signals output from pin ⑲ of IC702 (main driver IC).

The charging voltage is detected by pin ⑰ of IC701 (main MPU), and the charging is completed when the voltage reaches over 2.5V.

Radiation start and its duration are controlled by the EF-P (N-B) from IC702 pin ⑳ .

2-7. IC Pin Names and Functions

In the following are explained the pin terminals of the main control ICs used in the RC-251.

(1) Main MPU (IC701 MC68HC11A8)

PIN NO	PIN NAME	IN OUT	TO	FUNCTION
1	SHEND	IN	SUB MPU	
2-4	NC	OUT		
5	/SUBSEL	OUT	SUB MPU	SUB MPU communication start request (Low)
6	/MDRSEL	OUT	MAIN Dr	MAIN DRIVE communication start request (introduce)
7	/DOSEL	OUT	D/D IF	D/D IF communication start request (Low)
8	/CCDSEL	OUT	CLOCK	CLOCK communication start request (Low)
9	/RES SUB	OUT	SUB MPU	SUB MPU reset (Low)
10	/RD	OUT	CLOCK	Low when receiving data from read clock, D/D IF and main drive
11	/WR	OUT	D/D IF	Low when sending data to write clock, D/D IF and main drive
12	/AWR	OUT	MAIN Dr	Low when sending address data to address write clock, D/D IF and main drive
13	WB-OUT	IN	AWB SEN.	AWB sensor output, R/G, B/G level
14	WB-Vr	IN	AWB SEN.	Around 1.6
15	EV	IN	MAIN Dr	AE/EF sensor output; temperature compensation and amplification value with main drive
16	ALC	IN	PROCESS	No compensation when CCD brightness level for corrected photometry is below 2.0V; compensation when 0.5EV – 2.0EV
17	CHG-LVL	IN	FLASH	Flash charge; completed when voltage level reaches 2.5V
18	RFDET	IN	PROCESS	Threshold level for reproduction RF detection signal 0.2V, 2.5ms interval *6 = 1.2V minimum
19-20	1/4VBATT	IN	MAIN Dr	For voltage CH putting voltage of 1/4PbBATT (put in 1/4 by main drive)
21	VRL	IN	MAIN Dr	0V A/D conversion standard voltage 1 count (VRH-VRL)/256
22	VREF	IN		3.215V
23-24	VSS			
25	MODB(VDD)	IN		MODB (Hi) MODA (Low) Single chip mode (Internal ROM operation)
26	NC			
27	MODA(VSS)	IN		
28	STRA(VSS)	IN		STRA (Hi) Port C (34-42 pin) full handshake mode
29-30	NC (E STRB)			
31	7MHz	IN	CLOCK	External clock (7MHz) input
32-33	NC(NC XTAL)			
34	D0	IN-OUT		
35	NC		CLOCK	
36	D1	IN-OUT	D/D IF	Clock, D/D IF and main drive parallel data bus line D0 (LSB)
37	D2	IN-OUT	MAIN Dr	
38	D3	IN-OUT		
39	D4	IN-OUT		
40	D5	IN-OUT	D/D IF	D/D IF parallel data bus line D7 (MSB)
41	D6	IN-OUT		
42	D7	IN-OUT		
43	/RESET	IN	MAIN Dr	Main MPU reset by /RESET (Low) (Main drive is low when power introduce)
44	NC			
45	XIRQ	IN	SUB MPU	Interrupt by IRQ (Low) (When door and batt open)
46	/IRQ(VCCO)	IN		
47	RXD	IN	DEBUGGER	Serial port input for communication with external MPU
48	NC			
49	VSS			
50	TXD	OUT	DEBUGGER	Serial port output for communication with external MPU
51	MISO	IN		Serial port input for communication with SUB MPU
52	MOSI	OUT		Serial port output for communication with SUB MPU
53	SCK	OUT		Clock output for communication with SUB MPU
54	/SS(VSS)	IN		
55	VDD			VCCO
56	X	OUT	AWB SEN.	
57	PGOUT		PRO CLK D/D	PG timing
58	Z	OUT	AWB SEN.	RGB mode switching control for AWB sensor
59	Y	OUT		
60-61	NC			
62	WINDOW	OUT	PROCESS	CCD brightness level output request (Hi) when exposure corrected
63	FG	IN	Hall Dr	FG coil output voltage
64	PG	IN	HALL Dr	PG coil output voltage

AWB OUT when AMP power introduced

AWB OUT	X	Y	Z
	1	1	1
	0	1	0
R/G	1	1	0
	0	1	0
R/B	0	0	0
	1	1	1

(2) Main driver IC (IC702 SN28757)

PIN NO	PIN NAME	IN OUT	TO	FUNCTION
1	DRFB1	IN		Photo interrupter LED constant-current feedback input
2	DROUT1	OUT		Photo interrupter LED constant-current output
3	DRFB2	IN		Self LED constant-current feedback input
4	DROUT2	OUT		Self LED constant-current output
5	DAOUT	OUT	AE/EF SEN.	Light adjustment integral current control voltage
6	VC	OUT		AE/EF standard voltage
7	EV	OUT	MAIN MPU	AE/EF sensor output; temperature compensation and amplification
8	LOG DATA	IN		Op Amp input for AE correction
9	AE/EF IN	IN	AE/EF SEN.	Integral voltage input during light adjustment
10	PG-OUT	IN	MAIN MPU	PG coil output voltage
11	PG-TH	IN		PG coil connecting terminal
12	PG-IN	IN		PG coil connecting terminal
13	GND			
14	FG-IN	IN	SHUTTER	Photo interrupter
15	FG-TH			
16	FG-OUT	OUT	SHUTTER	
17	/PUG	IN		Condenser fitting terminal for /RESET when introducing power
18	VCC			
19	EF-P(N-A)	OUT	FLASH	Start of flash condenser charge (Low)
20	EF-P(N-B)	OUT	FLASH	Flash radiation a start (Low); radiation finish (Hi)
21	GND			
22	/EOLT	OUT	REGULATOR	VCCO output (Low); System control power source
23	VBATT			
24	/E4LT	OUT	REGULATOR	VCC4 output (Low); Reproduction regulator power source
25	/E3LT	OUT	REGULATOR	VCC3 output (Low); Pre-amp power source
26	/E2LT	OUT	REGULATOR	VCC2 output (Low); Recording power source
27	/E1LT	OUT	REGULATOR	VCC1 output (Low); CCD power source
28	/REC	OUT	PROCESS	REC and PLAY switchover signal; REC (Low)
29	/RES-CLK	OUT	COCK	Clock reset
30	/RES-OUT	OUT	MIGI	SUB MPU, D/D IF, HALL DRIVE and DUAL DRIVE reset
31	/RESET-MPU	OUT	MAIN MPU	MAIN MPU reset
32	/PW-ON	IN	SUB MPU	E0 ON control signal (Low)
33	NC			
34	VBAK(VDD)	IN		Power source for SW pull up
35	/CS	IN	MAIN MPU	Request for start of communication between main MPU and MAIN DRIVE (Low)
36	/WR	IN	MAIN MPU	Low when data received from main MPU
37	/RD	IN	MAIN MPU	Low when data sent from main MPU
38	/AWR	IN	MAIN MPU	Low when address data received from main MPU
39	D3	IN-OUT	MAIN MPU	MAIN MPU parallel data bus line
40	D2	IN-OUT	MAIN MPU	MAIN MPU parallel data bus line
41	D1	IN-OUT	MAIN MPU	MAIN MPU parallel data bus line
42	D0	IN-OUT	MAIN MPU	MAIN MPU parallel data bus line (D0 LSB)
43	V-REF	OUT	MAIN MPU	Voltage of 2.5 times VC used during A/D conversion; 3.215V
44	1/4VBATT	OUT	MAIN MPU	Voltage of 1/4 Pb BATT used during battery charge

(3) DD interface IC (IC703 TC17014AF-0205)

PIN NO	PIN NAME	IN OUT	TO	FUNCTION
1	VSS			
2	SIGH			
3	SIGL			
4	D7	IN-OUT	MAIN MPU	Parallel data bus line with MAIN MPU D7 MSB
5	D6	IN-OUT	MAIN MPU	Parallel data bus line with MAIN MPU
6	D5	IN-OUT	MAIN MPU	Parallel data bus line with MAIN MPU
7	D4	IN-OUT	MAIN MPU	Parallel data bus line with MAIN MPU
8-9	VSS			
10	D3	IN-OUT	MAIN MPU	Parallel data bus line with MAIN MPU
11	D2	IN-OUT	MAIN MPU	parallel data bus line with MAIN MPU
12	D1	IN-OUT	MAIN MPU	Parallel data bus line with MAIN MPU
13	D0	IN-OUT	MAIN MPU	Parallel data bus line with MAIN MPU DO LSB
14	/RD	IN	MAIN MPU	Read; Low when data sent to MAIN MPU
15	/WR	IN	MAIN MPU	Write; Low when data received from MAIN MPU
16	/AWR	IN	MAIN MPU	Address write; low when address data sent to MAIN MPU
17	/CS	IN	MAIN MPU	Request for start of communication from MAIN MPU (Low)
18	PLSIN	IN	MAIN MPU	PG timing PG COIL → MAIN Dr → MAIN MPU → D/D IF
19	SH1IN	IN	SUB MPU	Motor control signal for shutter
20	SH2IN	IN	SUB MPU	Motor control signal for shutter
21	PL-IN	IN	SUB MPU	MG control signal for shutter
22	PIN17	IN		
23	VDD			
24	PIN16	IN		
25	FM-MUTE	OUT		
26-27	NC			
28	FINDER-LED	OUT		View finder LED constant-current output
29	FD-REF			During fixed speed rotation of spindle motor; 250ns pulse generation
30	VSS			
31	HD-HLD	OUT	DUAL Dr	HEAD LOAD MG constant-current hold control signal (Low)
32	HD-LD	OUT	DUAL Dr	HEAD LOAD MG initial absorption control signal (Low)
33	SH1OUT	OUT		Motor drive signal for shutter
34	PH-B-	OUT	DUAL Dr	Head step motor control signal
35	PH-B+	OUT	DUAL Dr	Head step motor control signal
36	PH-A-	OUT	DUAL Dr	Head step motor control signal
37	SH1OUT	OUT		Motor drive signal for shutter
38	VSS			
39	SH2OUT	OUT		Motor drive signal for shutter
40	PH-A+	OUT	DUAL Dr	Head step motor control signal
41	/RESET	IN	MAIN Dr	Reset
42	SH2OUT	OUT		Motor drive signal for shutter
43	W.PROT	IN		SW W.P.
44	VSS			
45	DUTY-OUT	OUT	HALL Dr	Fixed speed rotation control signal for spindle motor (0 – 5V)
46	FG	IN		FG coil output voltage
47	NC			
48	PLOUT	OUT		MG drive signal for shutter
49	NC			
50	NC			
51	VSS			
52	PLOUT	OUT		MG drive signal for shutter
53	VDD			
54	NC			
55	AE/EF	OUT	AE/EF	Switchover between photometry and light adjustment modes (Low: Light adjustment mode)
56	NC			
57	W.PROT	IN		SW write protect
58	NC			
59	OSC-IN	IN	CLOCK	External clock input (4MHz)
60	/ERASE1	OUT	PROCESS	Power ON control for disk erasing (Low)

Motor control of shutter unit

SH1OUT	SH2OUT	
Low	Low	Break
Low	Hi	
Hi	Low	
Hi	Hi	Open

(4) Sub MPU (IC901 M34200M4-GP)

PIN NO	PIN NAME	IN OUT	TO	FUNCTION
1	NC			
2	BATT-OPEN	IN		SW BATT-OPEN
3	CS	IN	MAIN MPU	Communication start request form MAIN MPU
4	D9(VDD)			Intermediate voltage terminal for display (1/2 bias, 1/2 duty)
5	XIRQ	OUT	MAIN MPU	Interrupt by IRQ (Low) (Door open, batt open)
6	SOUT	OUT	MAIN MPU	Serial port output for communication with MAIN MPU
7	SIN	IN	MAIN MPU	Serial port input for communication with MAIN MPU
8	SCK	IN	MAIN MPU	Clock input for communication with main MAIN MPU
9	BRUSH		MAIN Dr	
10	CHEND	OUT	MAIN MPU	
11	SHOPL	OUT	D/D IF	Motor control signal for shutter
12	SHCLS	OUT	D/D IF	Motor control signal for shutter
13	PLNGR	OUT	D/D IF	MG control signal for shutter
14	/PW-ON	OUT	MAIN Dr	E0 ON control for switch sensing when power source introduced; initialized by turning SW2 on when system control erratic
15	/MODE	IN		SW MODE/ERASE
16	/SW2	IN		SW2
17	/SW1	IN		SW1
18	/REC	IN		SW REC
19	/PLAY	IN		SW PLAY (ERASE)
20	LOADED	IN		SW LOAD
21	/SCAN	IN		Electric current consumption low when in sleep mode (SW REC PLAY LOAD open)
22	XCIN	IN		32Hz quartz oscillation circuit (when LCD sub MPU operating)
23	XCOUT	OUT		32Hz quartz oscillation circuit (for high speed operation)
24	XIN	IN		800Hz quartz oscillation circuit (for high speed operation)
25	XOUT	OUT		800Hz quartz oscillation circuit (for high speed operation)
26	VSS			
27	VDD			SUB MPU power source; Pb BATT → 3V normally generated
28	/RESET	IN		SUB MPU reset
29				
30	GND			
31	GND			
32	V BAK			
33	VREF	IN		V-REF operation when VCCO on
34	/FLASH ON	IN		SW FLASH-ON
35	/FLASH OFF	IN		SW FLASH-OFF
36	/AC ADAPT.	IN		SW AC ADAPTOR
37	/BLC	IN		SW BCL
38	DOWN	IN		SW DOWN
39	UP	IN		SW UP
40	BATT-CHK	IN		For 1/4 VBATT SUB MPU prohibit voltage charge
41	GND			
42-50	SEG9~1	OUT		LCD drive wave pattern (1/2 bias, 1/2 duty)
51-52	NC			
53-54	COM1~0	OUT		LCD drive wave pattern (1/2 bias, 1/2 duty)
55	VLC1	IN-OUT		Intermediate voltage generating terminals for LCD (1/2 bias, 1/2 duty)
56	VLC2	IN-OUT		Intermediate voltage generating terminal for LCD (1/2 bias, 1/2 duty)
57	VLC3	IN-OUT		Intermediate voltage generating terminal for LCD (1/2 bias, 1/2 duty)
58-64	NC			

REPAIR INSTRUCTION

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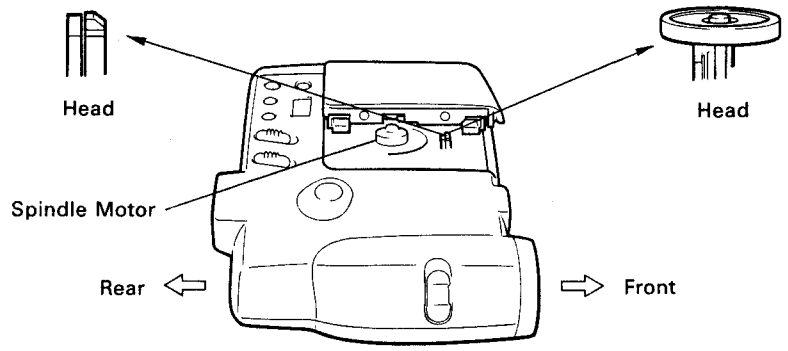
1. PRELIMINARY INSTRUCTIONS

- CAUTION.n In the Disassembling diagrams indicates the parts for which particular attention is required when disassembling and assembling.
- NOTE.n In the disassembling diagrams indicates the directions regarding the parts and wiring for which particular attention is required when disassembling and assembling.
- ADJ.n In the disassembling diagrams indicates the parts for which adjustment is necessary when disassembling or replacing.
- When the following units are disassembled their precision and performance cannot be guaranteed, so they have to be replaced.
  Disk drive unit
  Image unit (although the lens focus can be adjusted)
- As special measuring instructions and tools are needed for adjusting the volume of the following on the video process C.B.A., be sure not to touch them.
  VR301, VR302, VR303, VR304, VR305, VR401, VR402
- A personal computer, multiple tool, and adjustment software are needed for several adjustments. As this manual only describes the actual adjustments in which these are used, refer to their respective operator's manuals for a detailed explanation of their use.
- When handling the Flash C.B.A. be sure not to touch the high voltage circuit (Refer to Page 39 for details).
- Installation of 2 types of disk drive units Regarding the RC-251, 2 different types of disk drive unit (hereafter abbreviated to D.D.U.) for the pad methods are installed. (Regarding the technological content, refer to the item of page 18 "2. head loading ".)
  There is no difference in picture quality between disk drives, but it should be noted that when conducting repair, the program contents of E²PROM (System control C.B.A.) for the respective D.D.U.s are different.

(1) Points of difference

	Fixed pad method D.D.U. – incorporated BODY	Bernoulli plate method D.D.U. – incorporated BODY
1. D.D.U (1) Parts No. (2) Points of difference	CY1-6231-000 External appearance	CM1-0331-000 External appearance
		
(3) Classification by unit (Shape of the classification inscription is different.)	XXXXXP Classification symbol (Alphbet) Seal is on the D.D.U. frame.	XXXXXXXXX X S/N XXXX Classification symbol (Alphbet) The seal is made next to the seal which is stuck on the D.D.U. frame.

	Fixed pad method D.D.U. – incorporated BODY	Bernoulli plate method D.D.U. – incorporated BODY
2. System control C.B.A. Unit (1) Parts No. (2) Points of difference (3) Classification by unit	 CM1-0335-000 E²PROM writing data corresponds only to fixed pad method None	 Same as on left E²PROM writing data corresponds only to Bernoulli plate method None
3. Main unit classification (1) Body No. (2) Classification (3) Inscription location (Classification No.)	 1XXXXXXX ↳ Classification symbol (No.1) XXXXXX ↳ Classification No. (Not decieded) Classification No. is inscribed inside the battery compartment	 2XXXXXXX ↳ Classification symbol (No. 2) Same as on left Same as on left

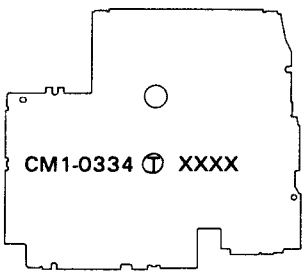
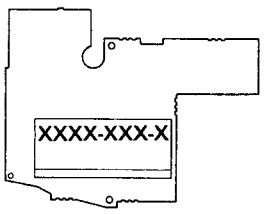
(2) Service response

	Service parts	Service countermeasure (Caution when replacing parts)
1. D.D.U	Both of the 2 types are kept in stock	D.D.U. should be replaced with the same type (In this case it is not necessary to rewrite data inside E²PROM of system control C.B.A.)
2. System control C.B.A unit	Parts corresponding to D.D.U. of each of the 2 types are kept in stock (Not clear which type is suitable)	When replacing the system control C.B.A., D.D.U. must be checked, and accurate data rewriting should be performed (For operation procedure, refer to ADJ.11 data writing item of "Repair Instructions", page 67)
3. D.D.U and System control C.B.A. unit		D.D.U possesses interchangeability by performing data rewriting.

Note: When replacing the system control C.B.A., rewriting for the data that matches the type of disk drive must be performed.
If this operation is neglected, the disk drive will not operate normally, and it is possible that the driver IC will be damaged.

(3) Classification of C.B.A.

The following shows the classification of the video process C.B.A. and system control C.B.A.

	Video process C.B.A.	System control C.B.A.
Classification No.	XXXX Classification symbol (alphabet)	XXXX-XXX-X Classification symbol (alphabet)
Inscription location	 Seal on video process C.B.A.	 Seal on system control C.B.A. DC/DC converter.

2. LIST OF TEST EQUIPMENTS, TOOLS AND SUPPLEMENTARY MATERIALS

2-1. Test Equipments and Tools

NEW	DESCRIPTION	TOOL.NO.
*	MULTIPLE TOOL (PERSONAL COMPUTER) See (RS232C CABLE) NOTE.1 (MS-DOS) (AC ADAPTER)	CY9-7072-000
*	ADJUSTMENT SOFTWARE(RC-251)	
*	STANDARD VF(RC-251)	CY9-1520-000
	F8 FIXED APETURE	CY9-1513-000
	EXTENSION CABLE RC-250	CY9-1514-000
	FOCUS CHART SET RC-250	CY9-1515-000
	RC-250 CONNECTOR	CY9-1511-000
	CCD RESET SIGNAL GENERATOR	CY9-1516-000
	OSCILLOSCOPE (WITH DELAY FUNCTION)	
	VECTORSCOPE(PAL)	
	DIGITAL TESTER	
	FREQUENCY COUNTER	
	EF500AC MULTI TESTER	CY9-7020-000

NEW	DESCRIPTION	TOOL.NO.
	COLOR MONITOR (PAL)	
	REGULATED DC POWER SUPPLY	CY9-7038-000
	STANDARD COLOR VIEWER (5100K)	CY9-7504-000 100 OR 115
	STANDARD COLOR VIEWER (3100K)	CY9-7506-000 100 OR 115
	COLOR BAR CHART	CY9-7504-001
	GRAY SCALE CHART	CY9-7504-006
	REFLECTING PLATE (18%)	
	DISCHARGE RESISTOR 1K OHM ,5W	
	BLACK CLOTH	
	HIGH FREQUENCY DRIVER	
	TRIPOD	
	TOOL BATTERY(OWN TOOL)	
	SLIT PLATE(OWN TOOL)	
	TOOL TOP COVER (OWN TOOL)	

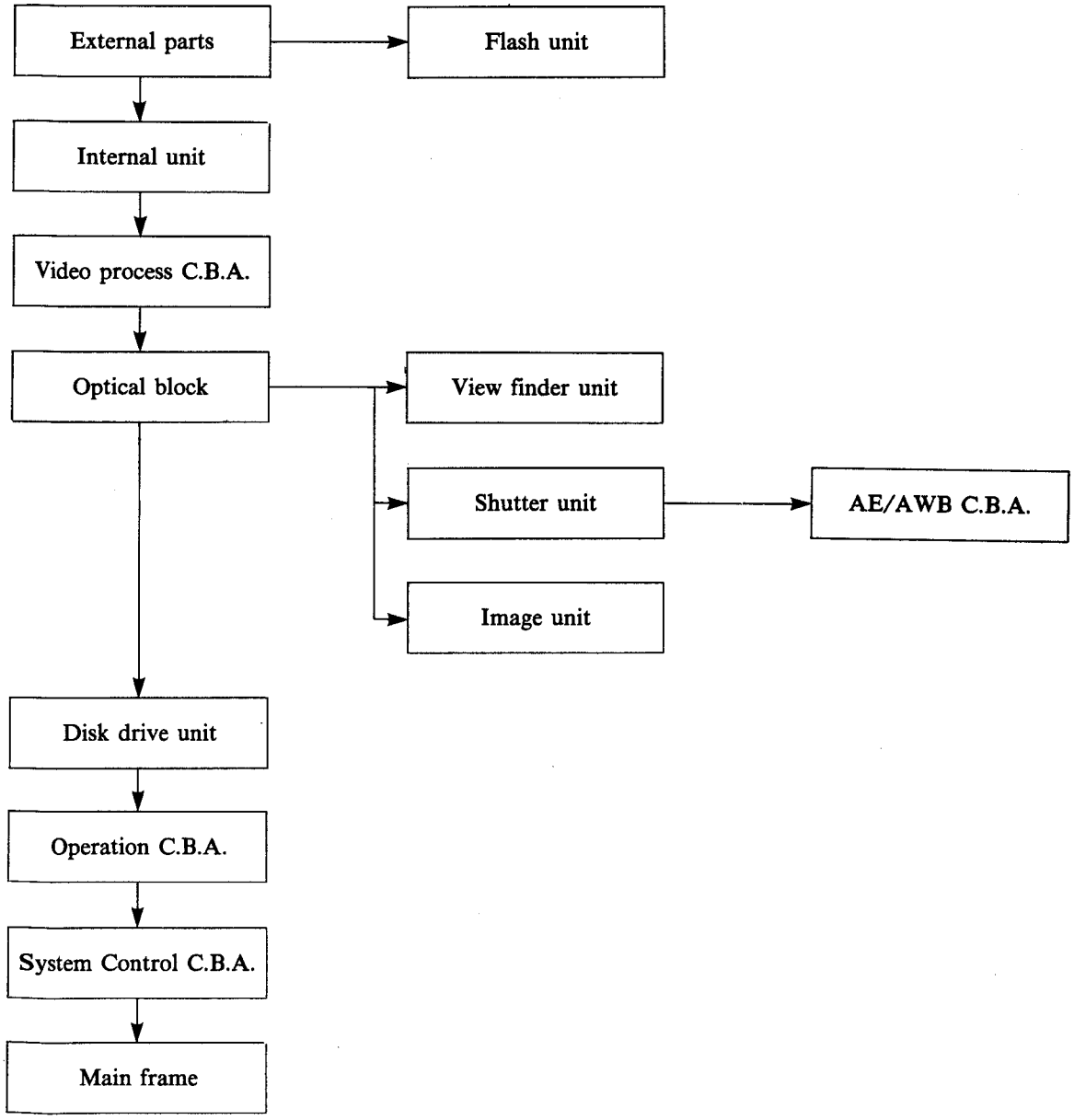
Note: 1. For a detailed explanation related to handling these items, refer to their respective operator's manuals.
2. Tools indicated by an asterisk (*), have been newly added to the list in this edition.

2-2. Supplementary Materials

DESCRIPTION	TOOL.NO.
THREE BOND 1401B [BLUE]	CY9-8012-000

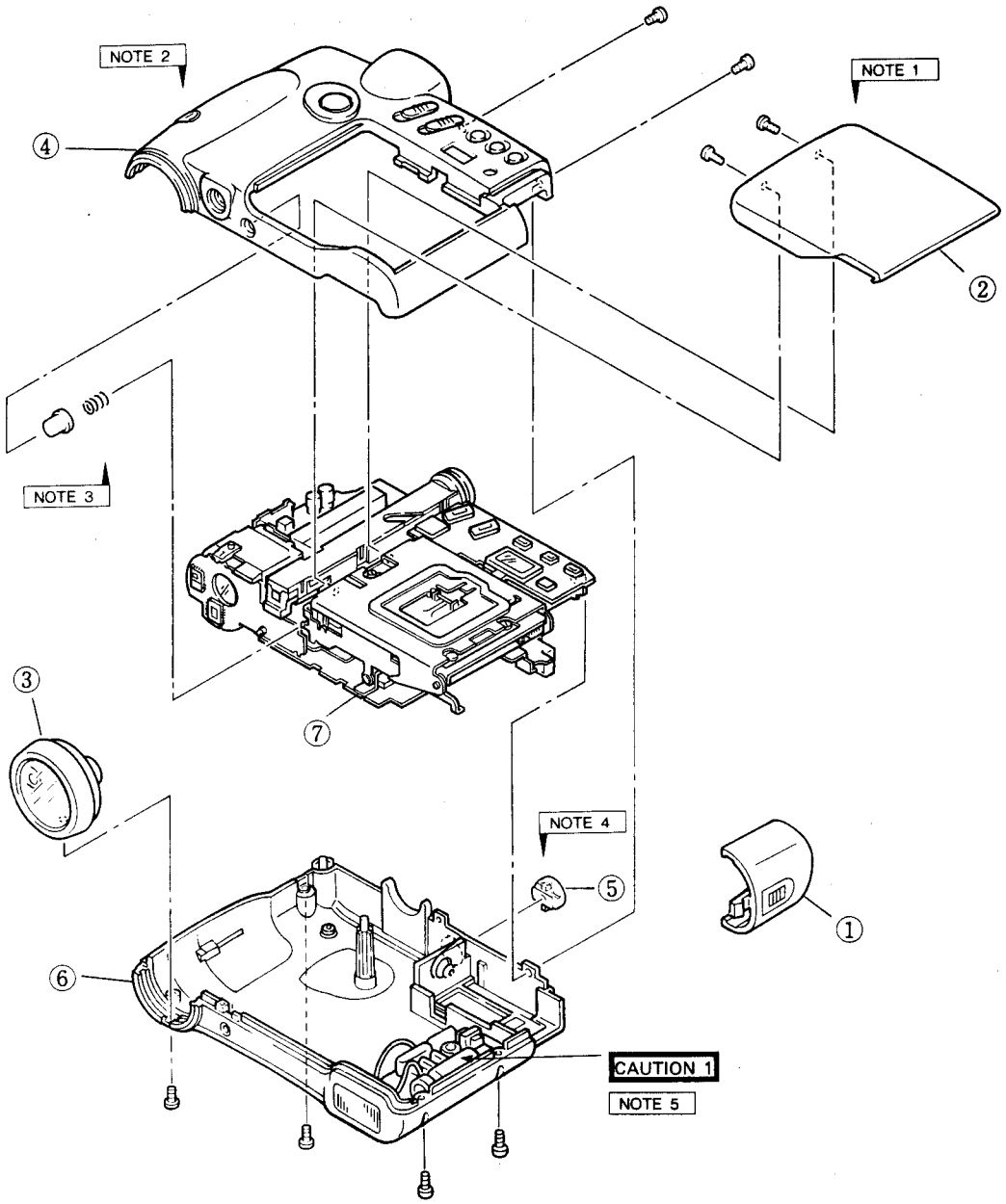
3. DISASSEMBLY FLOW CHART

The flow chart below illustrates the disassembling procedure in general terms.
This flow chart can be used for disassembling what needs to be disassembled when replacing parts.
See the disassembling and assembly section for the details of each procedure.



4. DISASSEMBLY (AND ASSEMBLY)

4-1. External



CAUTION 1

When removing the main unit from the lower section, before detaching the flash connector, discharge the flash unit's main capacitor using a discharge resistor.

NOTE 1

The sequence for disassembly of the disk cover is described below.

1) Remove the screws while the disk cover is open.
2) While holding the cover by hand, press down only on the metal case below the cover.
3) Remove the disk cover by disconnecting the catch on one side of the cover connected to the metal case.

When reassembling, install the disk cover while pressing down on the metal case only.

NOTE 2

When fitting the top cover to the internal unit, correctly align the positions of each switch, the switches on the unit side, and the unit side.

NOTE 3

When removing the top cover, be sure that the eject button spring does not fly off.

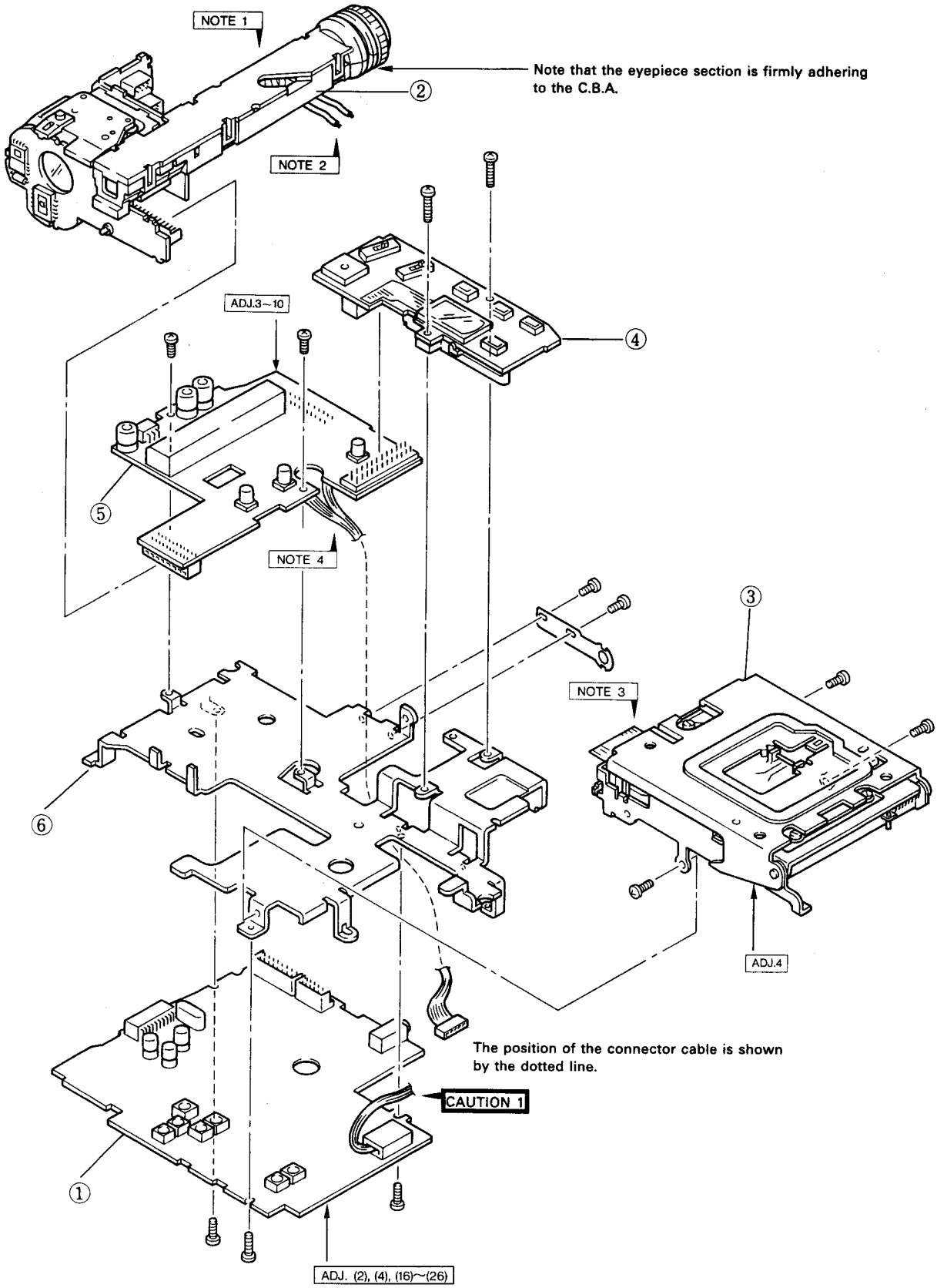
NOTE 4

When disconnecting the main unit from the bottom cover, first remove the jack cover ⑤.

NOTE 5

When installing the main unit into the lower section, be sure to avoid inserting the cable between the main unit and FLASH C.B.A.

4-2. Main unit


NOTE 1
Note that the eyepiece section is firmly adhering to the C.B.A.
②
NOTE 2
ADJ.3~10
④
⑤
NOTE 4
③
NOTE 3
⑥
ADJ.4
The position of the connector cable is shown by the dotted line.
CAUTION 1
①
ADJ. (2), (4), (16)~(26)

CAUTION 1

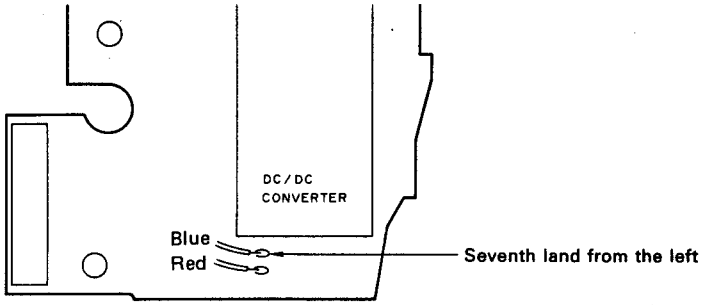
Take care as the lead wire connector from the Video Process C.B.A. is in the vicinity.

NOTE 1

When removing the otical block from the main unit, insert a minus screwdriver for example into the connectors at three points and loosen them uniformly little by little. Be careful of the C.B.A. and elements when doing this.
Also, when removing the AE C.B.A. connectors, first move the eyepiece section a little as it is in the way.

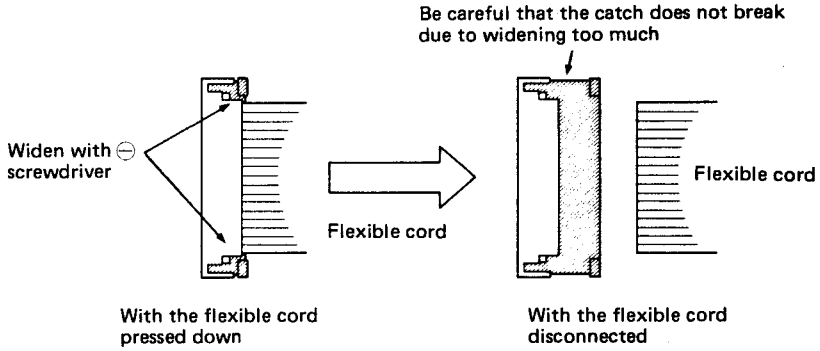
NOTE 2

The soldering positions for the two lead wires of the view finder LED are shown in the diagram below.



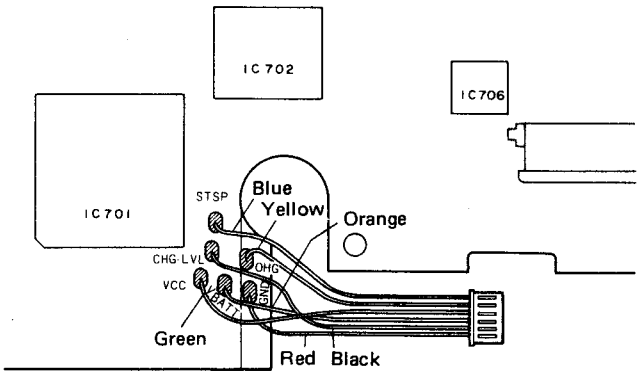
NOTE 3

When detaching the disk drive unit, handle the connector of the System Control C.B.A. in which the flexible cord from the disk drive is inserted as shown in the diagram below, and disconnect the flexible cord.

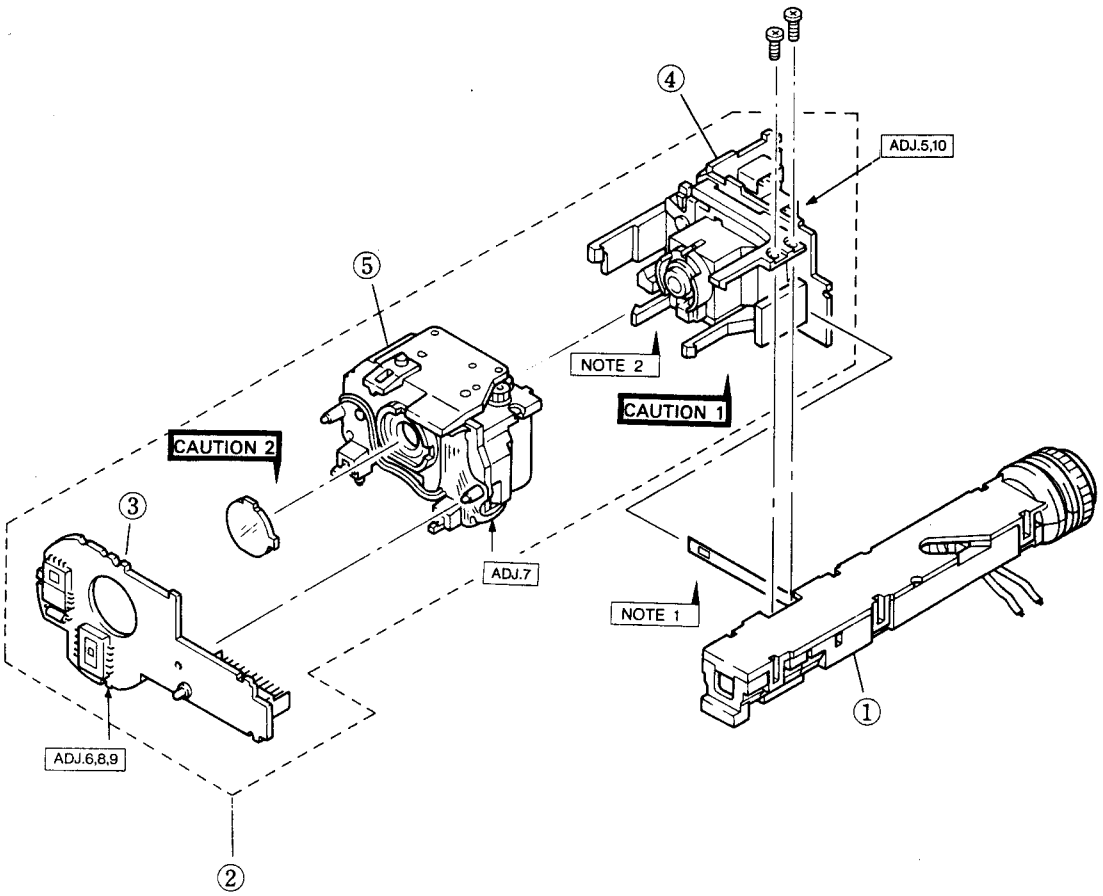

Be careful that the catch does not break due to widening too much
Widen with ⊖ screwdriver
Flexible cord
Flexible cord
With the flexible cord pressed down
With the flexible cord disconnected

NOTE 4

The soldering positions for the lead wires of the System Control C.B.A. panel connected to the flash unit are shown in the diagram below. It is not normally necessary to remove these.



4-3. Optical Block



CAUTION 1

As the two screws on the bottom of the image unit are for adjusting the lens focus, only loosen them when necessary.

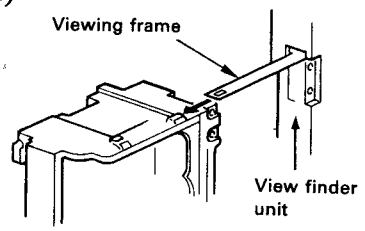
CAUTION 2

As far a possible only use a blower for cleaning. If wiping is necessary it should be done from top to bottom using cleaning liquid. (Any other way would lead to the coating coming off and deterioration in the spectral diffraction characteristics).
Use Three Bond 1401B [Blue] when adhering the shutter unit at the time of replacement.

NOTE 1

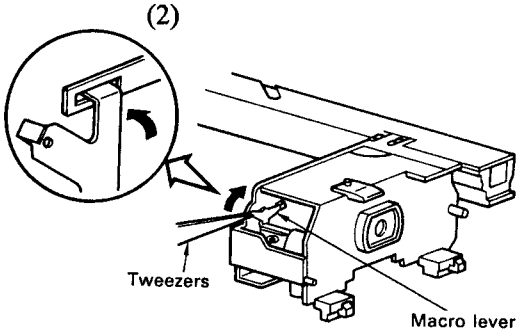
When detaching the view finder unit from the optical block, move the moltplane (refer to 3), then remove the viewing frame from the image unit (refer to 2), making sure that it is not deformed, while setting the macro lever attached to the image unit free with a pair of tweezers. For the assembly, see the diagram below.

(1)



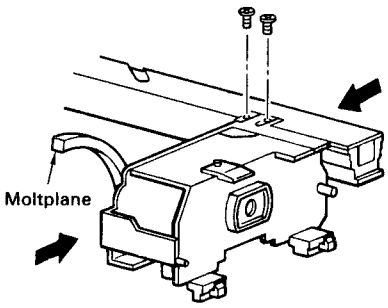
Insert the viewing frame into the image unit as shown in the diagram. (*As the image panel is attached this cannot actually be seen).

(2)



First align the positions for screw holes of the view finder unit and image unit. Then, while lifting the macro lever attached to the image unit with a pair of tweezers, raise upwards and insert in the holes of the viewing frame.

(3)



Press the view finder unit and image unit as indicated by the arrows, and tighten the screws in the order A, B.

NOTE 2

When setting the shutter unit and image unit, push them in until you hear a click, place them correctly in the 4 catches, and check to see that the two units are fixed properly.

5. ADJUSTMENTS

5-1. Outline of Adjustments

(1) Multiple tool and personal computer needed

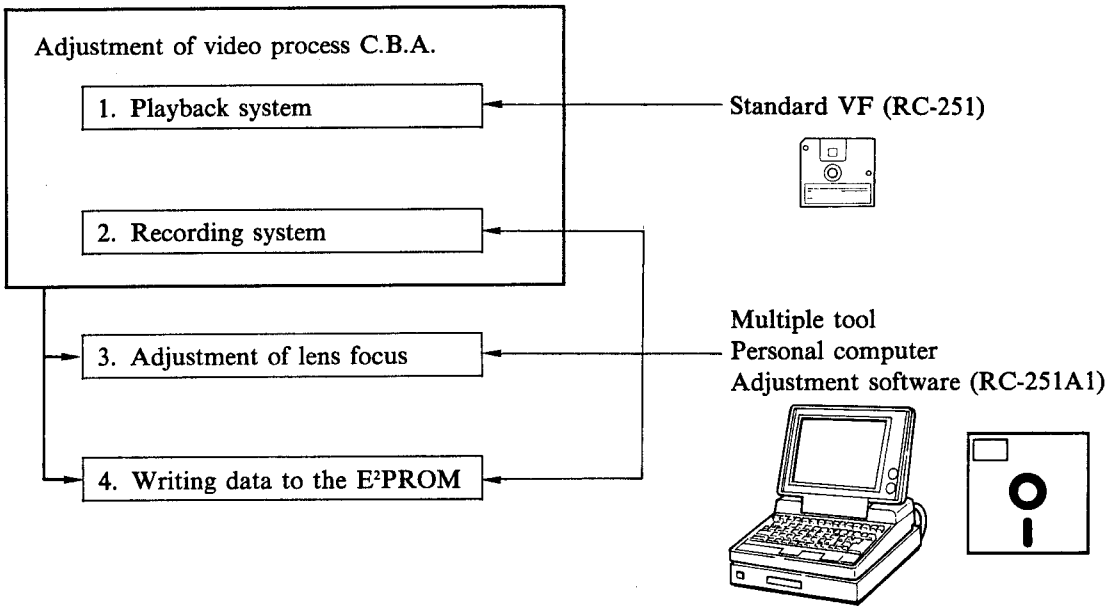
The multiple tool and personal computer are needed for almost all of the RC-251 adjustments

(2) Standard VF needed

Standard VF (RC-251) in which the standard signals have been recorded are needed to adjust the Playback system of the video process C.B.A.

(3) Adjustment procedure

Conduct the adjustment following the sequence of procedures shown below.



5-2. Use of multiple tool

5-2-1 Cautions

(1) When connecting the RC-251 and the multiple tool, turn ON the power supply of each of the multiple tool and personal computer, then connect after starting the program.
(2) If the red charge lamp of the multiple tool lights up, attach the AC adapter and charge the tool immediately. The tool may be used for approximately 30 minutes after lighting of the red lamp, but if the battery life is extinguished completely, incorrect data may be written to the RC-251 after the multiple tool stops operating.

5-2-2 Adjustment software

(1) Software supply

Because of the copyright problem related to MS-DOS and other reasons such as differences in MS-DOS systems for specific personal computers, Canon Inc. will supply only a floppy disk containing the adjustment software (no MS-DOS) to sales company.

If each corporation copies the floppy disk for distribution to affiliated groups, the copy for distribution also will not contain MS-DOS.

Accordingly, the service operator must copy the adjustment software into the system disk to produce an operating floppy disk (MS-DOS) containing the adjustment software.

- Canon Inc. → Sales company → Service operator

  Software production → FD for adjustment (No MS-DOS) → Copy → Copy FD (No MS-DOS) → System copy → Operating FD (MS-DOS)

- Floppy disks to be supplied from Canon:
  NEC PC-9801 ..... 5 inch (2HD), 3.5 inch (2HD)
  IBM PC ..... 5 inch (2D), 3.5 inch (2DD)

Each corporation shall supply the required floppy disks as described above.

(2) Copying the software

Note that formatted disks, system disks and the method of making copies differ with each type of personal computer, MS-DOS and other relevant factors. The following description is one example of these.

A. Method of producing the copy FD (In case of using PC9801VX, 2 drives)
   Produce a copy of the floppy disk by following the procedure described below.
   1) Insert the MS-DOS system disk into drive A, then turn the power supply ON.
   2) Insert an empty floppy disk into drive B, input "FORMAT␣B:", then press the RETURN KEY.
   3) Remove the MS-DOS system disc from drive A, then insert the floppy disk containing the adjustment software into the same drive (A).
   4) Input "MCOPY␣A:␣B:", then press the RETURN KEY.

B. Method of producing the operating FD (In case of using PC9801VX, 2 drives)
   Fundamentally, the same procedure as 1) to 4) in A above is conducted. However, instead of inputting "FORMAT␣B:" in 2), the input command is "FORMAT␣B:␣/S".

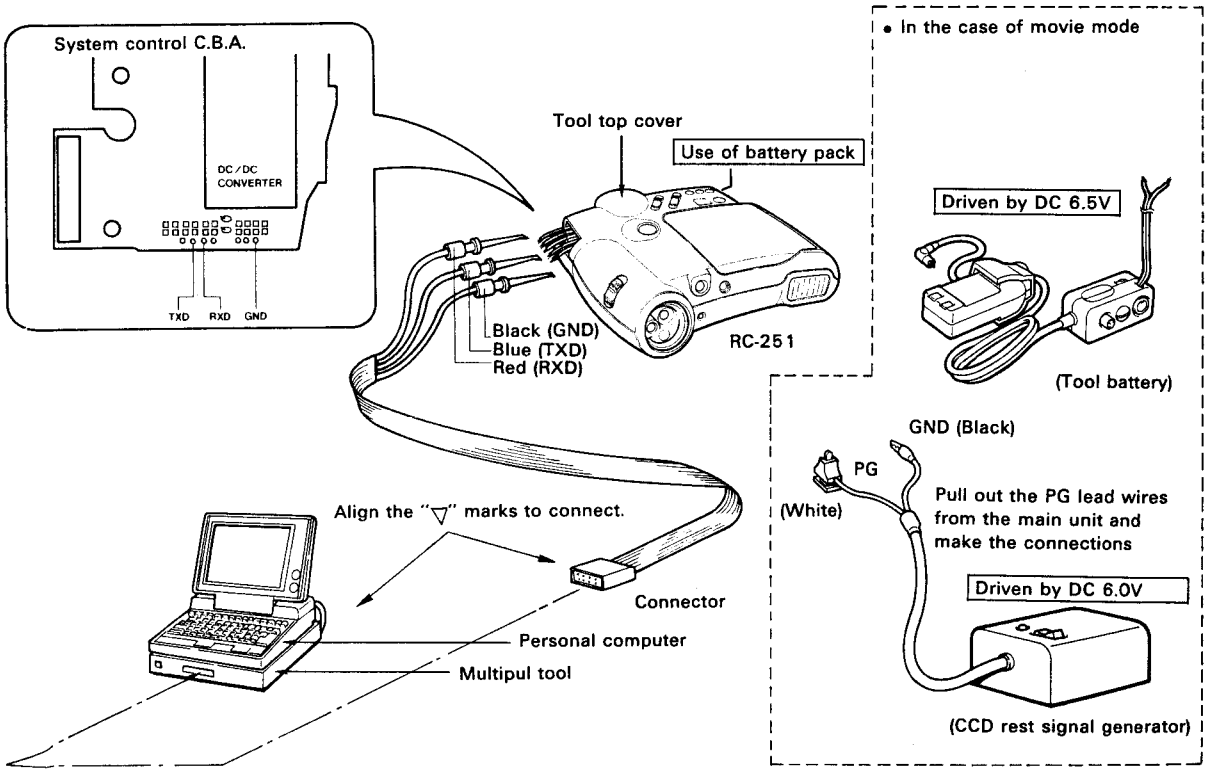
* MS-DOS is a trademark of Microsoft Corporation.

5-2-3 Connecting to RC-251

There are two connection modes, which comprise connection for data writing, and connection to set up the movie mode. These connections are described below.

(1) Connection for data writing (Basic connection)
Make the connections following the sequence of procedures given below.
1) Remove the top cover from the RC-251, then solder the lead wire (10 cm or more) to the TXD, RXD, GND lands on the system control C.B.A.
2) Install the top cover for use of the tool instead of the top cover that was removed in step 1). Pull out 3 lead wires from the main unit.
3) Connect the RC-251, connectors, multiple tool and other components by referring to the figure below.

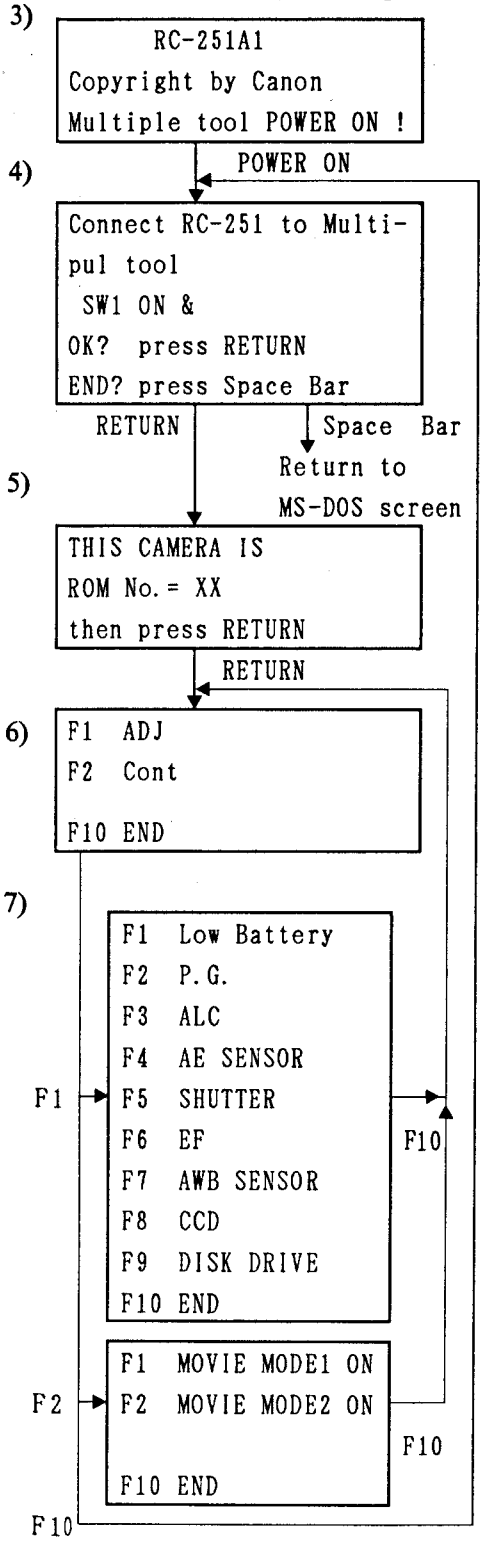
(2) Connection for setting movie mode (video process C.B.A.; connections for adjustment of the recording system)
Make the connections following the sequence of procedures given below. (Fundamentally, the same procedures as described in (1) are to be conducted, but the CCD reset signal generator and the tool battery are needed in this case.)
1) Remove the top cover from the RC-251, then solder the lead wire (10 cm or more) to the TXD, RXD, GND lands on the system control C.B.A.
2) To allow input of the reset signal (PG), remove the soldered jumper (SP202) of the video process C.B.A. and solder the lead wire (10 cm or more) to the PG input terminal (CP228) (See Pg 65).
3) Install the top cover for use of the tool instead of the top cover that was removed in step 1). Pull out 4 lead wires from the main unit.
4) Connect the RC-251, connectors, multiple tool, CCD reset signal generator, battery and other components by referring to the figure below.
[A voltage of the power supply to the RC-251 should be approx. 6.5V (Operation possible at the inhibit voltage or below). Note that if the movie mode is continued at this or higher voltages, damage may occur to ICs within the RC-251.]



5-2-4 Method of starting

Start the adjustment following the sequence of procedures given below.

1) Check that the RC-251 and multiple tool are not connected, then insert the floppy disk in which the adjustment software (RC-251A1) has been copied into the FDD.
2) Turn ON the power supply of the personal computer. (If power is already being supplied to the computer, press the reset SW.)
   From this point, operation proceeds by interactive input into the personal computer.



The screen shown on the left is displayed. As indicated by the message on the screen, turn ON the power supply of the multiple tool.

As indicated on the screen, connect the multiple tool to RC-251, then press the RETURN KEY while pressing the RC-251 shutter button (SW1). Continue to press the shutter button until the message indicating that communication is in progress is displayed in the screen.
If END is selected (by not pressing SW1), the display returns to the MS-DOS screen.

Check the ROM version of the RC-251, then press the RETURN KEY. If the ROM version of the RC-251 is changed in the futureand the adjustment software version is not compatible, the error screen will be displayed. In this case, start with adjustment softwares of different versions in order.

The screen shown on the left is displayed. Use the cursor key to select the item you want to start, then press the RETURN KEY.

[F1] ADJUSTMENT: Select when you want to perform data writing adjustment shown in (7).

[F2] CONTROL: Select when you want to adjust the video process C.B.A. (recording system) and focus of the lens.

[F10] END: Returns to the screen shown in (4).

Screen for data writing to E²PROM.
For details related to F1 –F9, refer to the explanations given in ADJ.2 –ADJ.11.

[F10] END: Returns to the screen shown in 6).

Movie mode screen
For details related to F1 and F2, refer to the explanation given in ADJ.1.

[F10] END: Returns to the screen shown in 6).

5-3. Adjustments

Table of adjustments accompanying replacement of parts

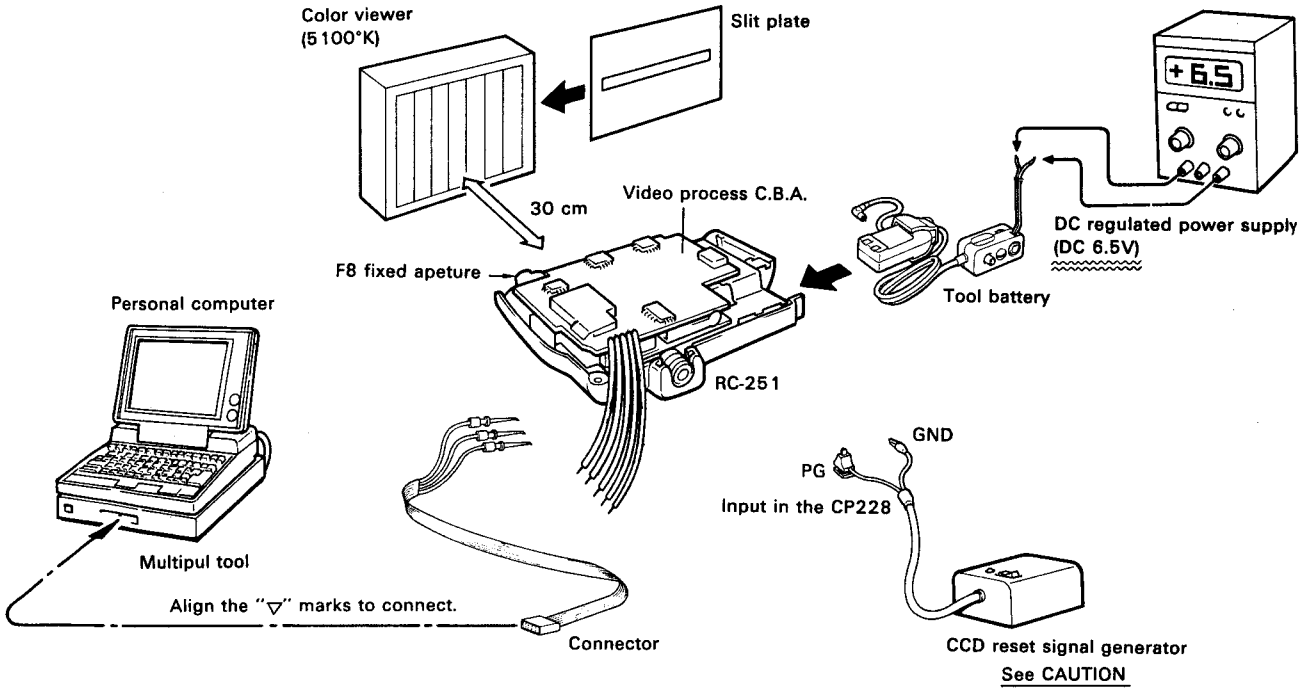
Adjustment item			(1) Limitter level	(2) Y-FM equalizing	(3) Y DEMOD. level	(4) Deemphasis	(5) PB.Y' level	(6) Carrier Frequency	(7) Chroma Demod level	(8) Chroma Delay level	(9) Carrier Balance	(10) Setup level	(11) Skew level	(12) Carrier Phase	(13) Burst Phase	(14) Skew Phase	(15) Output Video Gain	(16) G Clamp level	(17) B Clamp level	(18) R Clamp level	(19) Y Black level	(20) G gain	(21) B gain	(22) R gain	(23) R-Y gain	(24) B-Y gain	(25) Y gain	(26) Y clip	lens focus	Inhibit voltage	PG Phase	ALC	AE Sensor	Flash light	Shutter	AWB Sensor	CCD defect correction	Disk Drive
Replacement part																																						
● Disk Drive Unit				○																										○							○
● Shutter Unit																																		○			
● Image sensor Unit																							○	○	○	○	○	○	○	◁		○				○	
S/H.IC (IC103)																							○	○													
● AE/AWB C.B.A.																																○	○		○		
AE/EF IC (IC801)																																○	○		○		
AWB IC (IC802)																																			○		
● System Control C.B.A.																																			○	○	○
● Video Process C.B.A.				○		○												○	○	○	○	○	○	○	○	○	○	○	○							
Pre-Pro IC (IC201)																		○	○	○	○	○	○	○												
Process IC (IC202)																									○	○	○	○	○								
Y Corr. IC (IC203)																									○	○	○	○	○								
Pre Amp IC (IC401)				○		○																															
Demod IC (IC502)					○	○	○		○	○							○																				
1H DL IC (IC508)										○																											
1H DL IC (IC510)							○						○				○																				
Encorder IC (IC512)							○					○	○	○	○		○																				
SSG IC (IC504)								○			○			○	○	○																					
1/2H DL IC (IC513)													○	○		○	○																				
● POWER SUPPLY C.B.A.			○																																		
Video process C.B.A. playback system		ADJ.1	(1) Limitter level	(2) Y-FM equalizing	(3) Y DEMOD. level	(4) Deemphasis	(5) PB.Y' level	(6) Carrier Frequency	(7) Chroma Demod level	(8) Chroma Delay level	(9) Carrier Balance	(10) Setup level	(11) Skew level	(12) Carrier Phase	(13) Burst Phase	(14) Skew Phase	(15) Output Video Gain	(16) G Clamp level	(17) B Clamp level	(18) R Clamp level	(19) Y Black level	(20) G gain	(21) B gain	(22) R gain	(23) R-Y gain	(24) B-Y gain	(25) Y gain	(26) Y clip										
Video process C.B.A. Recording system																													ADJ.2	lens focus	ADJ.3	Inhibit voltage	ADJ.4	PG Phase	ADJ.5	ALC	ADJ.6	AE Sensor	ADJ.7	Shutter	ADJ.8	Flash light	ADJ.9	AWB Sensor	ADJ.10	CCD defect correction	ADJ.11	Disk Drive
Data input adjustment																																					

The lens focus adjustment is actually mechanical ↵

○: Adjustment required
△: Confirmation
(Monitor check of picture quality)

ADJ.1 Video process C.B.A. volume adjustment

- Objective: This adjustment is performed to allow correct signal processing in recording and playback.
- Tools used: Multiple tool, adjustment software (RC-251A1), connectors, color viewer, (5100° K), DC regulated power supply, tool battery, oscilloscope, vectorscope, frequency counter, digital tester, standard VF(RC-251), slit plate (own tool), color bar chart, gray scale chart, F8 fixed apeture.
- Adjustment preparations
  Connect the equipment as shown in the connection diagram below. Refer to item (2) in Section "5-2-3 Connecting to RC-251" for details about connecting the multiple tool.



- Method of Adjustment
  Conduct adjustment following the sequence of procedures given below.
  Playback system (1) – (15) Use standard VF(RC-251)

  Recording system (16) – (26) Use the multiple tool { Movie mode 1 / Movie mode 2
- Cautions
  - Turn on the power of the CCD Reset signal generator when the "MOVIE MODE ON!" is displayed on the screen.
  - Select the movie mode using the procedure described in Section "5-2-4 Method of starting" and in accordance with the procedure described below.

```
F1  MOVIE MODE 1
F2  MOVIE MODE 2


F10 END
```

F1 MOVIE MODE 1
This allows output of the R.G.B. signal connected from the CCD.

F2 MOVIE MODE 2
In addition to the function of F1, this allows 9dB gain up of the output signal.

F10 Returns to the adjustment and control function screen.

- The numbers given in parenthesis for adjustment points and adjustment volume in each adjustment item, indicate positions shown in the Section "5-4 Adjustment points" on page 67.
- In the case of the video process C.B.A. supplied as a service part, the Playback system has been completely adjusted with the exception of the Y-FM equalizer (2) and Deemphasis (4).

• Play back system

* Conduct adjustment with the VF in play back status. Ensure that the drive voltage is DC 8.0V, and do not use the multiple tool.
* When there is no specific indication for the scanning method switchover SW, select the interlace mode.
* When stated that the measuring point is at Video Out, do the measurements at the 75Ω terminate.

(1) Limitter level

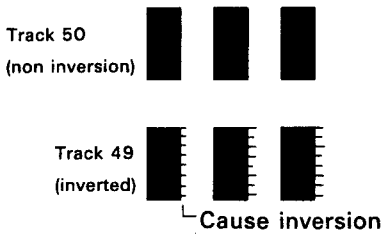
Standard VF / Standard chart	Main SW	Measuring apparaus
Refer to Note	PLAY	Digital tester
Measuring point	Adjust volume	Standard
CP606 (F.7) CP607 (F.7)	VR505 (F.7)	800±10 mV DC

Note: Adjust the potential difference between CP606-607 to 800±10 mV 15 minutes after supplying power (press SW1 after approximatelly 10 minutes so that the automatic stop function operates and the power is not turned OFF).
Also, replay an unrecorded track of the standard VF for 15 minutes after supplying power, and replay the color bar (5 Tr) when adjusting.

(2) Y-FM equalizing

Standard VF / Standard chart	Main SW	Measuring apparaus
Refer to Note	PLAY	Monitor
Measuring point	Adjusting volume	Stnadard
Video Out	VR501 (F.8)	Refer to Note

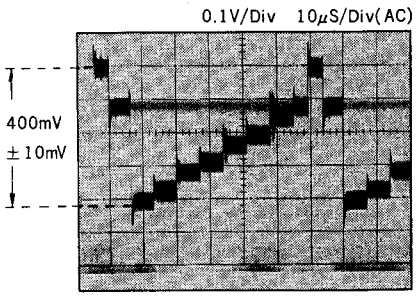
Note: Replay 50TR and purposely generate luminance inversion with VR501. Next, turn the VR501 in the direction of reduction in luminance inversion, then align VR501 in the position where luminance inversion is not generated.



(3) Y DEMOD. level

Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar	PLAY	Oscilloscope
Measuring point	Adjusting volume	Stnadard
CP603 (D.6)	VR502 (E.7)	400±10mVp-p

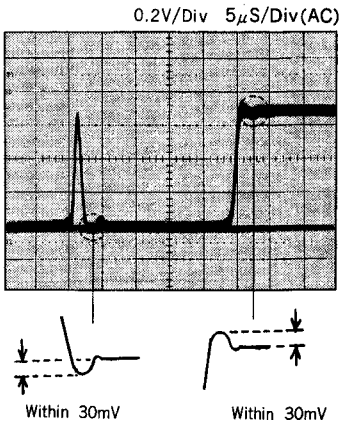
Note: Playback the standard VF (Color bar) and measure the 100% white wave pattern.



(4) Deemphasis

Standard VF / Standard chart	Main SW	Measuring apparaus
Sin^2 wave	PLAY	Oscilloscope
Measuring point	Adjust volume	Stnadard
CP605 (E.7)	VR504 (E.7)	Refer to Note

Note: Playback the standard VF (3TR), then adjust so that the section indicated by the arrows is within 30mV.

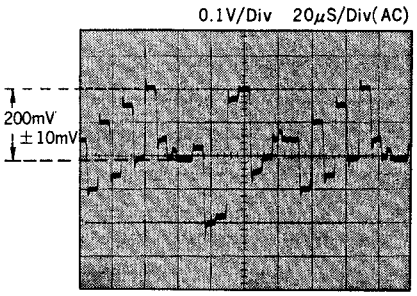


(5) Carrier frequency

Standard VF	Standard chart	Main SW	Measuring apparaus
		PLAY	Frequency counter
Measuring point		Adjust volume	Standard
CP614 (G.3)		TC501 (F.3)	4.433619 MHz ±50Hz

(6) Chroma DEMOD. level

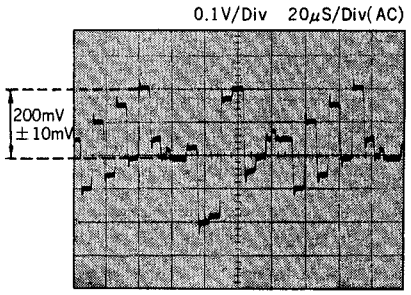
Standard VF	Standard chart	Main SW	Measuring apparaus
Color bar		PLAY	Oscilloscope
Measuring point		Adjusting volume	Standard
CP610 (C.6)		VR503 (D.7)	200±10mVp-p



Note: Adjust so that the red to pedestal levels of the color differential signals are 200±10mVp-p.

(7) Chroma delay level

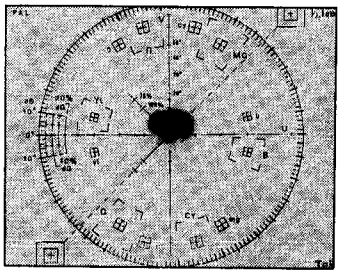
Standard VF	Standard chart	Main SW	Measuring apparaus
Color bar		PLAY	Oscilloscope
Measuring point		Adjusting volume	Standard
CP611 (E.5)		VR507 (D.5)	200±10mVp-p



Note: Adjust so that the red to pedestal levels of the color differential signals are 200±10mVp-p.

(8) Carrier balance (White Balance Adjustment)

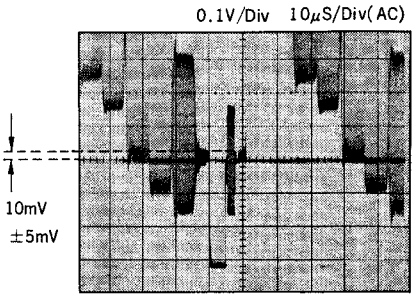
Standard VF	Standard chart	Main SW	Measuring apparaus
Multi Burst		PLAY	Vectorscope
Measuring point		Adjust volume	Standard
Video Out		B-Y: VR509 (E.5) R-Y: VR512 (F.5)	Refer to Note



Note: Set the vectorscope gain to max, then replay the standard VF (1,20 or 35 Tr), and adjust so that the luminescent spot is as close as possible to the center.

(9) Setup level

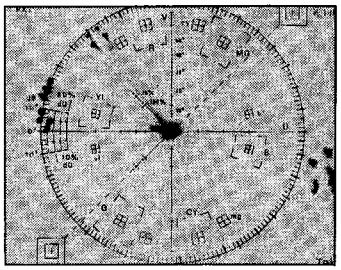
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar	PLAY	Oscilloscope
Measuring point	Adjusting volume	Standard
Video Out (CP625 H.7)	VR510 (E.4)	10±5mV



Note: Adjust the set up level to within 10±5mV of the pedestal level.

(10) Carrier phase

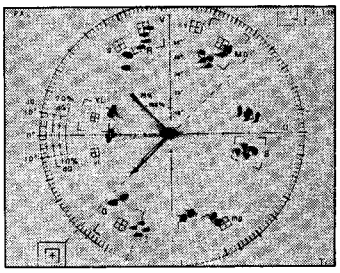
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar	PLAY	Vectorscope
Measuring point	Adjusting volume	Standard
Video Out	TC502 (E.4)	±2%



Note: Use the vectorscope to adjust so that the length of 2 burst signals is the same.

(11) Burst phase

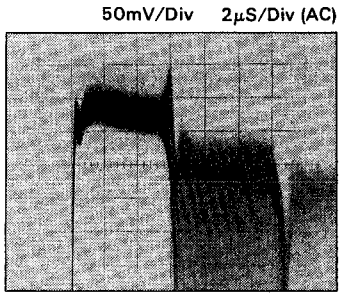
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar	PLAY	Vectorscope
Measuring point	Adjust volume	Standard
Video Out	VR511 (F.5)	135° ± 3° 225° ± 3°



Note: Use the vectorscope to adjust so that the position of two burst signals is 135° and 225°.

(12) Skew level

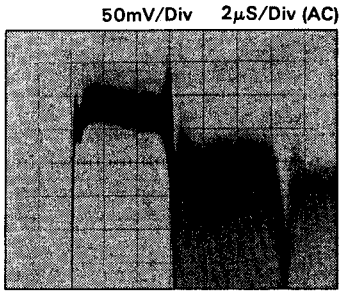
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar	PLAY	Oscilloscope
Measuring point	Adjusting volume	Standard
Video Out (CP625 H.7)	VR514 (H.5)	0±5mV



Note: Complete adjustment after 1.5 ~ 2 minutes of supplying power, and select the noninterlace mode. Adjust so that the difference between the first and second field white peak level (100%) components is within 0±5mV.

(13) PB Y' level

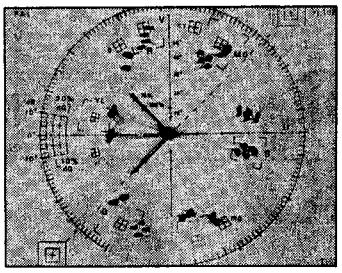
Standard VF	Standard chart	Main SW	Measuring apparaus
Color bar		PLAY	Oscilloscope
Measuring point		Adjust volume	Standard
Video Out CP625 (H.7)		VR508 (G.4)	0±5mV



Note: Complete adjustment after 1.5 ~ 2 minutes of supplying power. Then adjust so that the difference between the luminance signal levels of the first and second fields is 0±5 mV. (Select the interlace mode)

(14) Skew phase

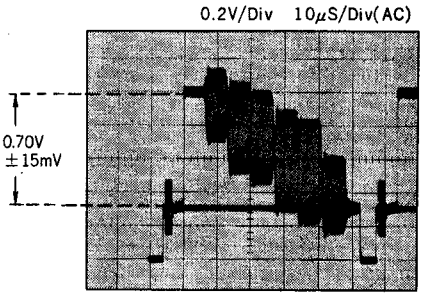
Standard VF	Standard chart	Main SW	Measuring apparaus
Color bar		PLAY	Vectorscope
Measuring point		Adjust volume	Standard
Video Out		VR513 (G.4)	Refer to Note



Note: Adjust to eliminate disturbance of the red luminescent spot (standard: ±1%, within 5°).

(15) Output video gain

Standard VF	Standard chart	Main SW	Measuring apparaus
Color bar		PLAY	Oscilloscope
Measuring point		Adjust volume	Standard
Video Out (CP625 H.7)		VR506 (H.7)	0.70V±15mV



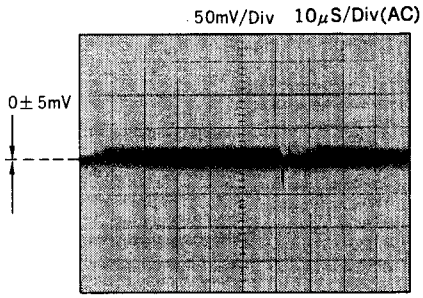
Note: Adjust the white peak level to within 700±15mV of the pedestal level.

• Recording system

* Use the multiple tool.

(16) G clamp level

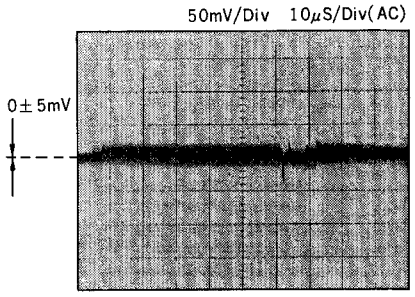
Standard VF	Standard chart	Main SW	Measuring apparaus
Shading		REC	Oscilloscope
Measuring point		Adjusting volume	Standard
TP201 (B.4)		VR205 (C.1)	0±5 mV



Note: Movie mode: Measure with 9dB gain up (MOVIE MODE 2).
After adjustment, there should be no change when set to normal MOVIE MODE, (MOVIE MODE 1).

(17) B clamp level

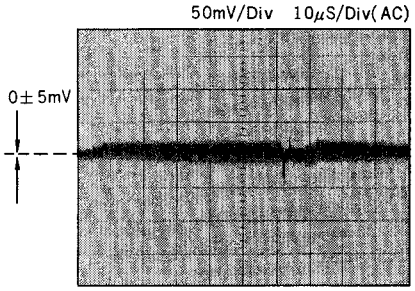
Standard VF	Standard chart	Main SW	Measuring apparaus
Shading		REC	Oscilloscope
Measuring point		Adjusting volume	Standard
CP211 (A.4)		VR204 (C.2)	0±5 mV



Note: Movie mode: Measure with 9dB gain up (MOVIE MODE 2).
After adjustment, there should be no change when set to normal MOVIE MODE, (MOVIE MODE 1).

(18) R clamp level

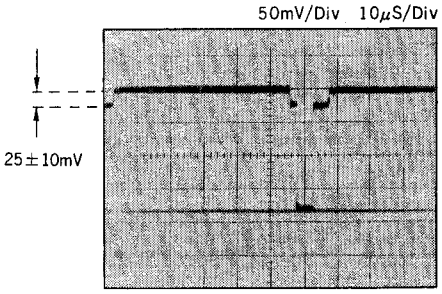
Standard VF	Standard chart	Main SW	Measuring apparaus
Shading		REC	Oscilloscope
Measuring point		Adjusting volume	Standard
CP210 (A.4)		VR206 (C.1)	0±5 mV



Note: Movie mode: Measure with 9dB gain up (MOVIE MODE 2).
After adjustment, there should be no change when set to normal MOVIE MODE, (MOVIE MODE 1).

(19) Y Black level

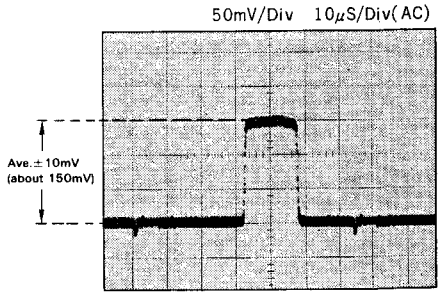
Standard VF	Standard chart	Main SW	Measuring apparaus
Shading		REC	Oscilloscope
Measuring point		Adjusting volume	Standard
CP222 (B.7)		VR207 (C.2)	25±10 mV



Note: Movie mode: Measure with 9dB gain up (MOVIE MODE 2).
After adjustment, there should be no change when set to normal MOVIE MODE, (MOVIE MODE 1).

(20) G gain

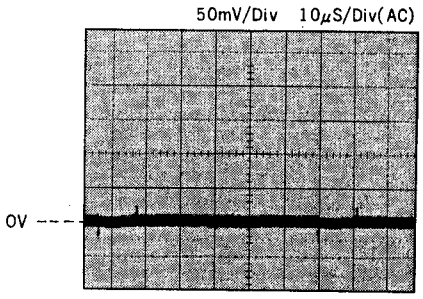
Standard VF	Standard chart	Main SW	Measuring apparaus
Color bar		REC	Oscilloscope
Measuring point		Adjusting volume	Standard
TP201 (B.4)		VR202 (B.1)	Refer to Note



Note: Measure the white waveform in MOVIE MODE 1 with the fixed aperture tool attached.
Use the aforementioned method to measure 5 units of the product and take the average as standard.

(21) B gain

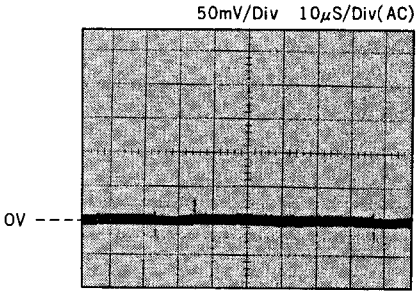
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar (White)	REC	Oscilloscope
Measuring point	Adjusting volume	Standard
CP221 (A.7)	VR201 (B.1)	0±5 mV



Note: Measure the white waveform in MOVIE MODE 1 with the fixed aperture tool attached.

(22) R gain

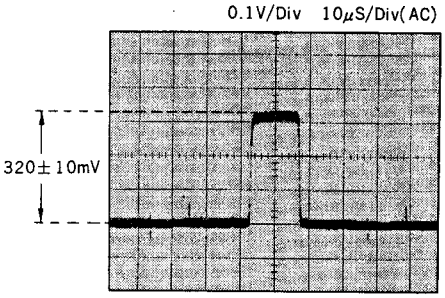
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar (White)	REC	Oscilloscope
Measuring point	Adjusting volume	Standard
CP220 (A.7)	VR203 (B.1)	840±40 mV



Note: Measure the white waveform in MOVIE MODE 1 with the fixed aperture tool attached.

(23) R-Y gain

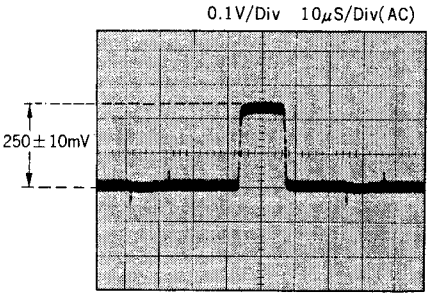
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar (Red)	REC	Oscilloscope
Measuring point	Adjusting volume	Standard
CP220 (A.7)	VR209 (A.7)	320±10 mV



Note: Measure the red waveform in MOVIE MODE 1 with the fixed aperture tool attached.

(24) B-Y gain

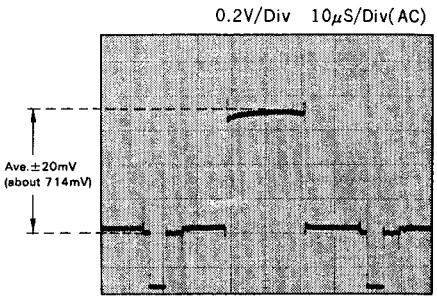
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar (Blue)	REC	Oscilloscope
Measuring point	Adjusting volume	Standard
CP221 (A.7)	VR210 (A.7)	250±10 mV



Note: Measure the blue waveform in MOVIE MODE 1 with the fixed aperture tool attached.

(25) Y gain

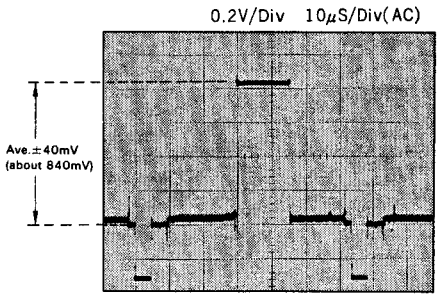
Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar (White)	REC	Oscilloscope
Measuring point	Adjusting volume	Standard
CP222 (B.7)	VR208 (C.5)	Refer to Note



Note: Measure the brightness signals in MOVIE MODE 1 with the fixed aperture tool attached.
Use the aforementioned method to measure 5 units of the product and take the average as standard.

(26) Y clip

Standard VF / Standard chart	Main SW	Measuring apparaus
Color bar (White)	REC	Oscilloscope
Measuring point	Adjusting volume	Standard
CP222 (B.7)	VR211 (A.6)	Refer to Note

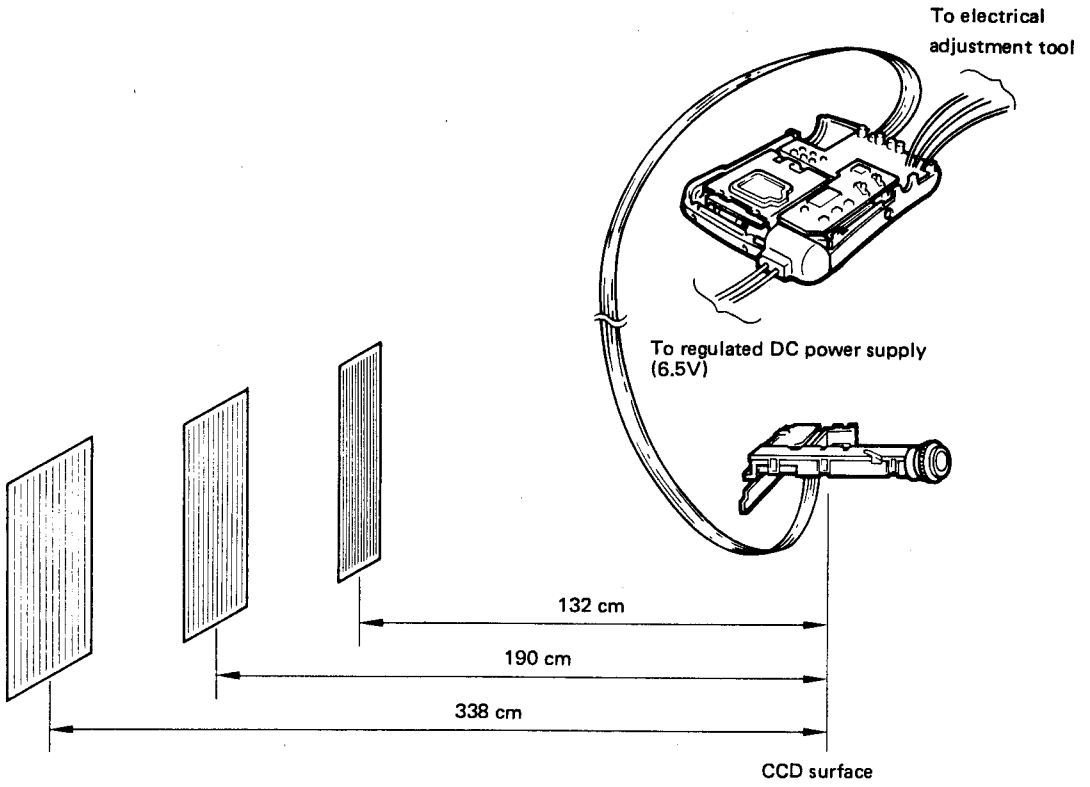


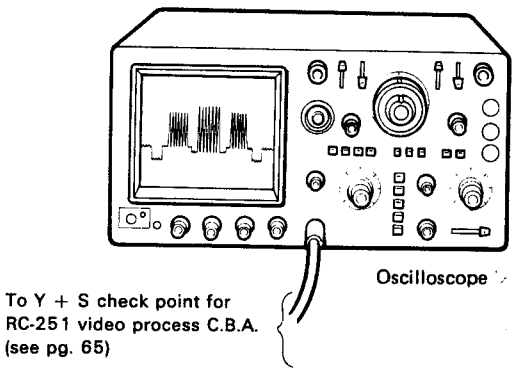
Note: In MOVIE MODE 1, without the fixed aperture tool attached, after adjusting the saturation waveform, check that there is no change in Y black level (see (19)).
Use the aforementioned method to measure 5 units of the product and take the average as standard.

ADJ.2 Lens focus adjustment (Stock the adjusted image sensor unit as service.)

- Objective: The image formation position of the lens is set to a distance of 1.9 m from the subject.
- Tools used: Oscilloscope, Tool set for movie mode adjustment, focus chart set, Extention cable, Regulated DC Power Supply.

- Adjustment preparations
  Set as indicated below.

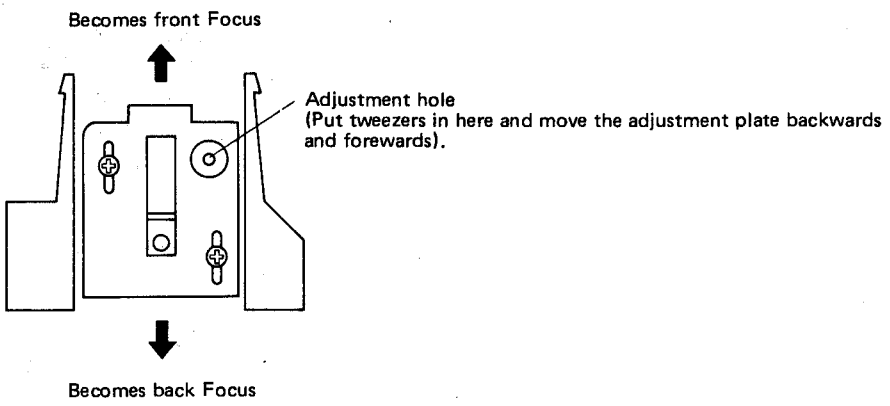




● Method of adjustment

1. Create the movie mode 1 using the multiple tool and personal computer (see pg. 46, 47 and 49)
2. While looking at the chart with the finder, maneuver the optical block so that it enters uniformly. (Once positioned, the optical block is shaded from the light except for the front part).
3. Measure the Y + S check point terminal (see pg. 67) for the video process C.B.A. with the oscilloscope.
4. At this time, move the lens focusing adjustment plate backwards and forwards to make the amplitude of the waveform of the far point (338 cm) and near point (132 cm) charts the same.

● Adjustment points


Becomes front Focus
Adjustment hole
(Put tweezers in here and move the adjustment plate backwards and forewards).
Becomes back Focus

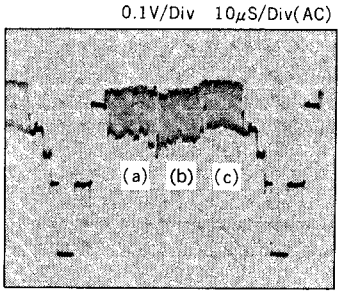
Bottom of image unit

● Cautions

- When employing the movie mode, use a tool battery and set the voltage to 6.5V.
- Every effort should be made to have the brightness of the three chart surfaces the same and the background as black as possible.
- The RC-251's macro switch should be turned off (normal position).

● Standard

Make the amplitude of (a) and (c) the same.

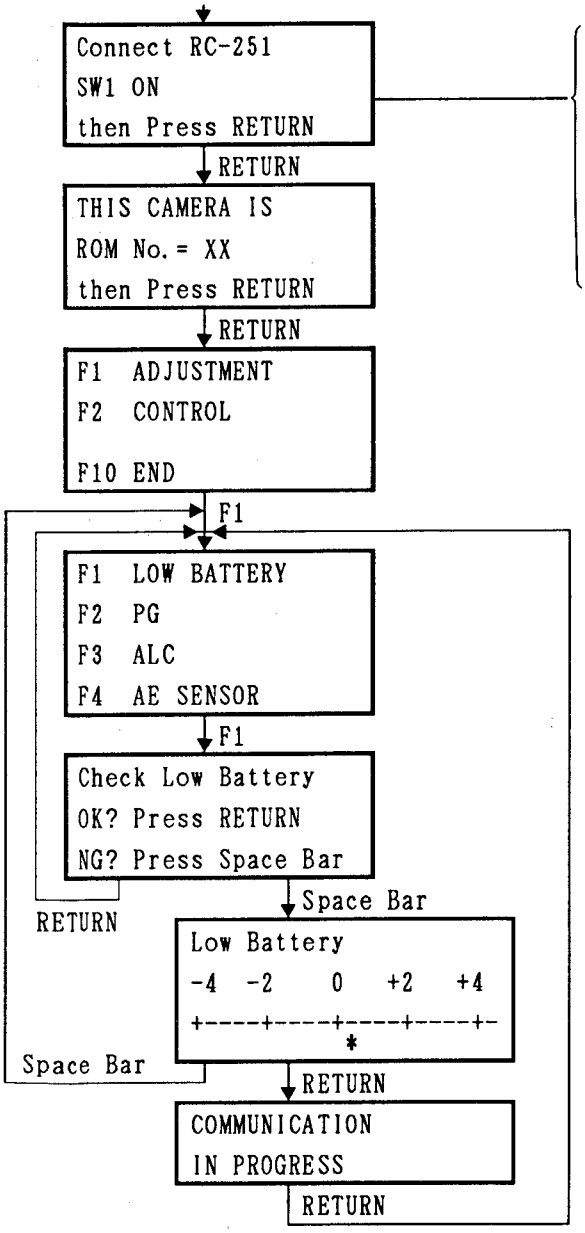


Y + S output wave pattern

(a) Chart wave pattern for near point (132 cm)
(b) Chart wave pattern for best point (190 cm)
(c) Chart wave pattern for far point (338 cm)

ADJ.3 Inhibit voltage adjustment

- Objective: Inhibits RC-251 when the voltage drops below a certain level, to guarantee operating precision by depressing (dissipating) the voltage. Adjust this inhibit voltage.
- Tools used: Tool set for data writing, VF, Digital tester
- Standard: 6.7±0.2V
- Method of adjustment:
  Using the service tool battery power supply (insulate the center of the battery's contact point with tape or other material, to create a state similar to that when using a lead acid battery) place the VF into the RC-251, then set the SW to "REC". When SW1 is ON, measure the output voltage of the constant voltage power supply with a digital tester when the Lb message on the LCD begins to flash. Adjust if the value is outside the standard (6.7±0.2V).



When the display shown on the left appears, place an unrecorded VF in the RC-251, then set the main SW to "REC".
While turning SW1 repeatedly ON and OFF, check the voltage when the Lb message on the LCD of RC-251 begins to flash. When the next display appears after checking is completed, remove the VF from the RC-251. (This is to prevent communication error.)

Using the cursor key, set the asterisk mark * to the correction value, then press the RETURN KEY. (Criterion: +1 cursor +50 mV)

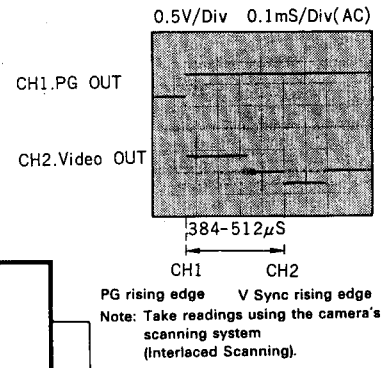
Refer to NOTE

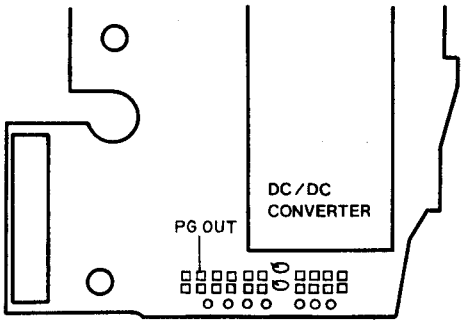
Data writing in progress

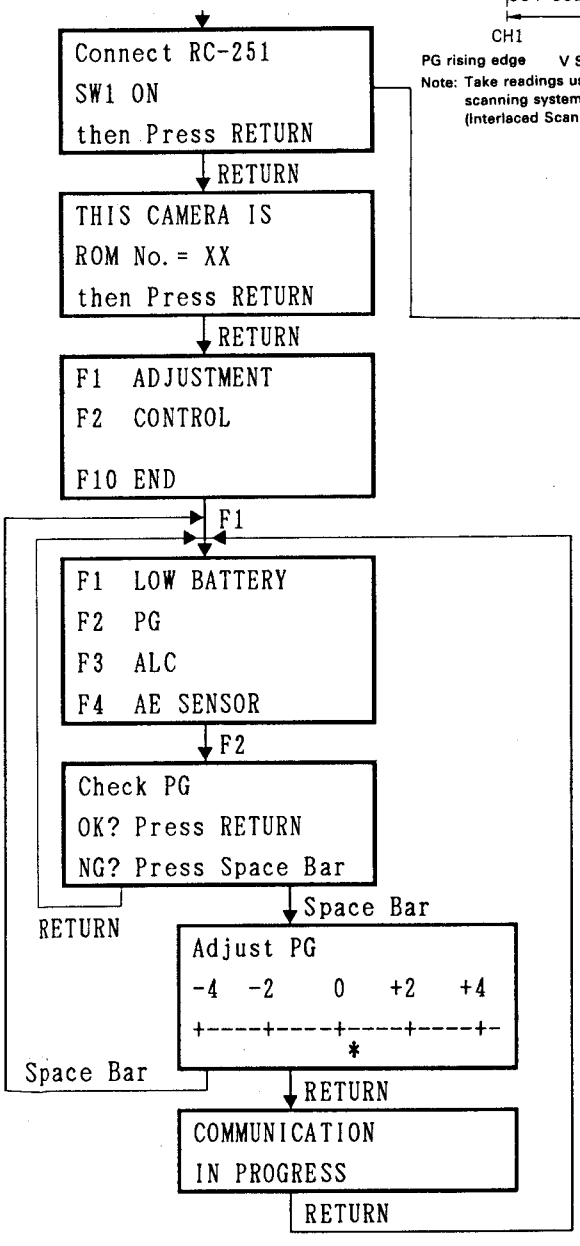
NOTE : When the system control C.B.A. is replaced by a new unit, press the space bar, then press the RETURN KEY with the setting at * 0. (The basic data of the inhibit voltage is not written into the stocked service parts. Therefore, when replacing parts provisional data must be written as a preliminary adjustment procedure.)

ADJ.4 PG phase adjustment

- Objective: The start position for writing into and reading from the VF is to be corrected to within 7H±2H.
- Tools used: Tool set for data writing, standard VF (RC-251), VF for recording, oscilloscope.
- Standard: 7H±1H (448±64 μS) from V synchronous prerecording
- Method of adjustment:
  Play back the first track of the standard VF(RC-251), then measure the PG Out waveform and the Video Out waveform on the oscilloscope. (Below for the PG Out checkpoint; the Video Out checkpoint is the Video Out jack of the RC-251.) Adjust if the waveforms do not conform to the standard (384-512 μS). After adjustment, take a few photographs and check that they fall within the standard.







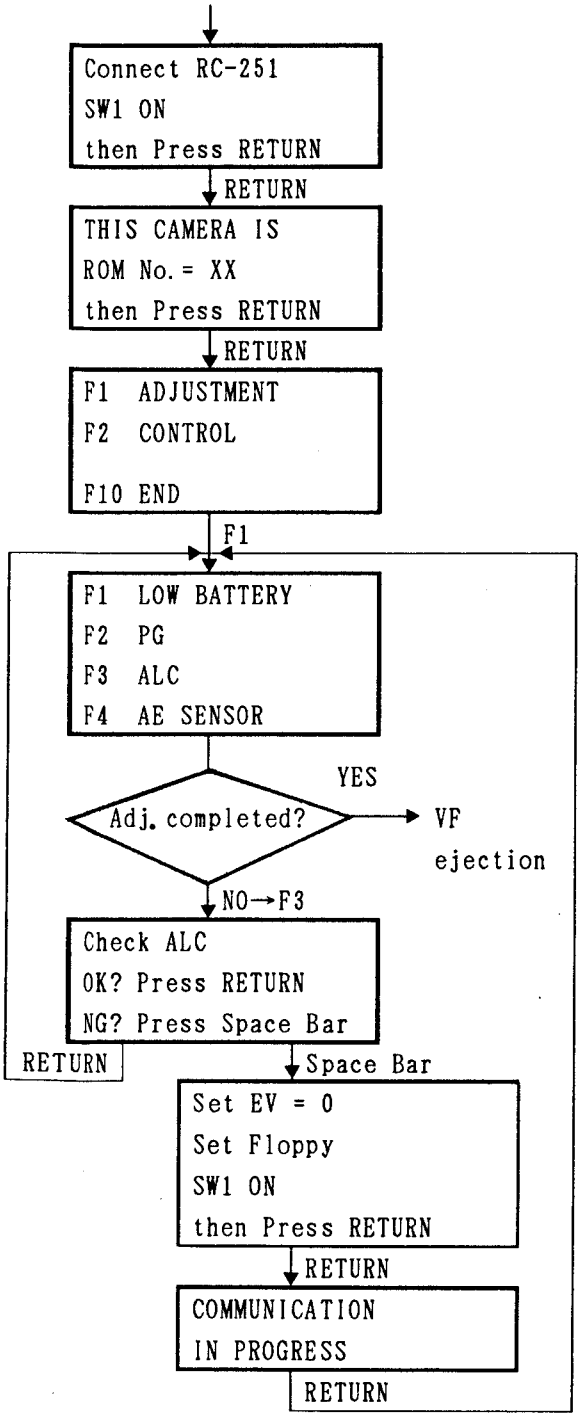
When the display shown on the left appears, place the standard VF into the RC-251, set the main SW to "PLAY", then check the waveform when the the first track has been played back. When the next display appears after checking is completed, remove the VF from the RC-251. (This is to prevent a communication error.)

Using the cursor key, set the asterisk mark * to the correction value, then press the RETURN KEY.
(Criterion: +1 cursor +35 μS)

Data writing in progress

ADJ.5 ALC adjustment

- Objective: This is for adjusting the level of feed-back AE for the CCD
- Tools used: Tool set for data writing, VF for recording, Black cloth
- Method of adjustment:



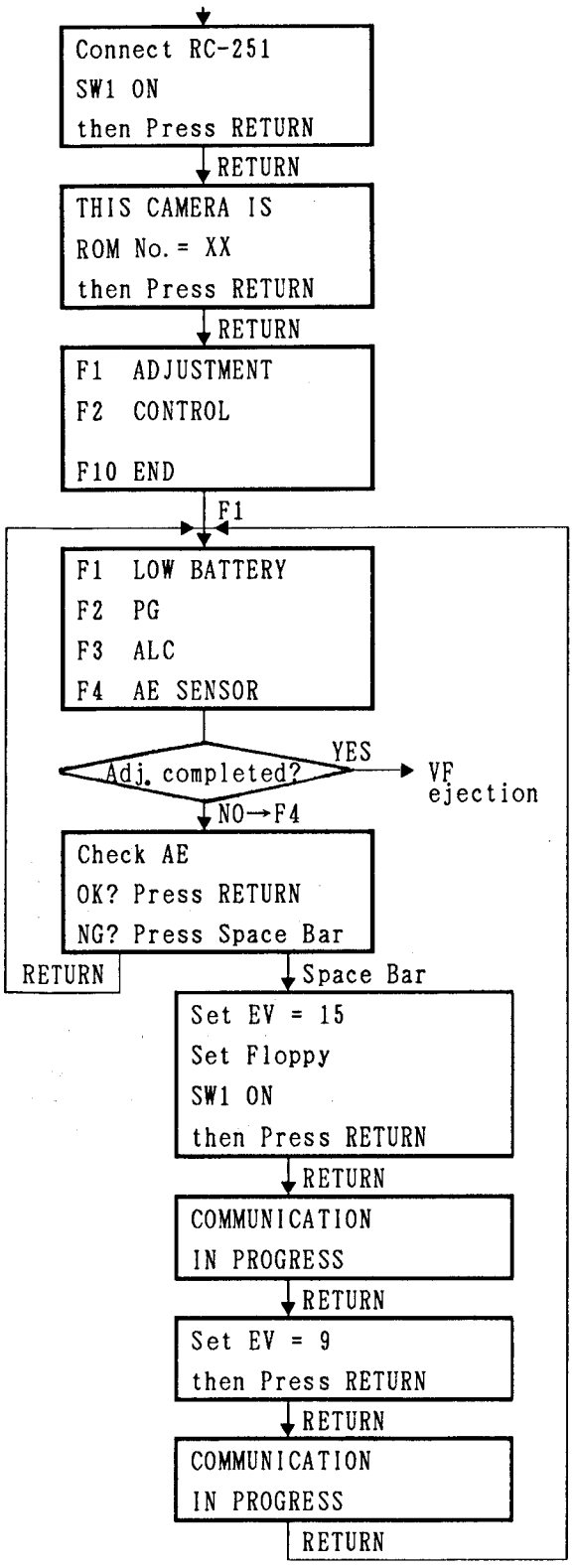
If ALC adjsutment is not conducted properly, abnormal exposure will occur at low luminance. Be sure to conduct adjustment whenever the system control C.B.A. unit or image unit is replaced.

When the display shown at the left appears, place an unrecorded VF in the RC-251, then cover the camera with a light-blocking cloth. Next, release the camera once, then with SW1 kept on, press the RETURN KEY.

Data writing in progress

ADJ.6 AE sensor adjustment

- Objective: To correct the level and gain of the AE sensor to obtain appropriate light metering data.
- Tools used: Tool set for data writing, VF for recording, EF500
- Method of adjustment:
  Using EF500 (K value: 12.5), set in the order EV15, EV9 according to the instructions given by the personal computer.



When the display shown at the left appears, place an unrecorded VF in the RC-251, set the EF500 to EV15, then press the RETURN KEY while pressing SW1. (If a VF is not placed in the camera, the light metering circuit will not operate.)

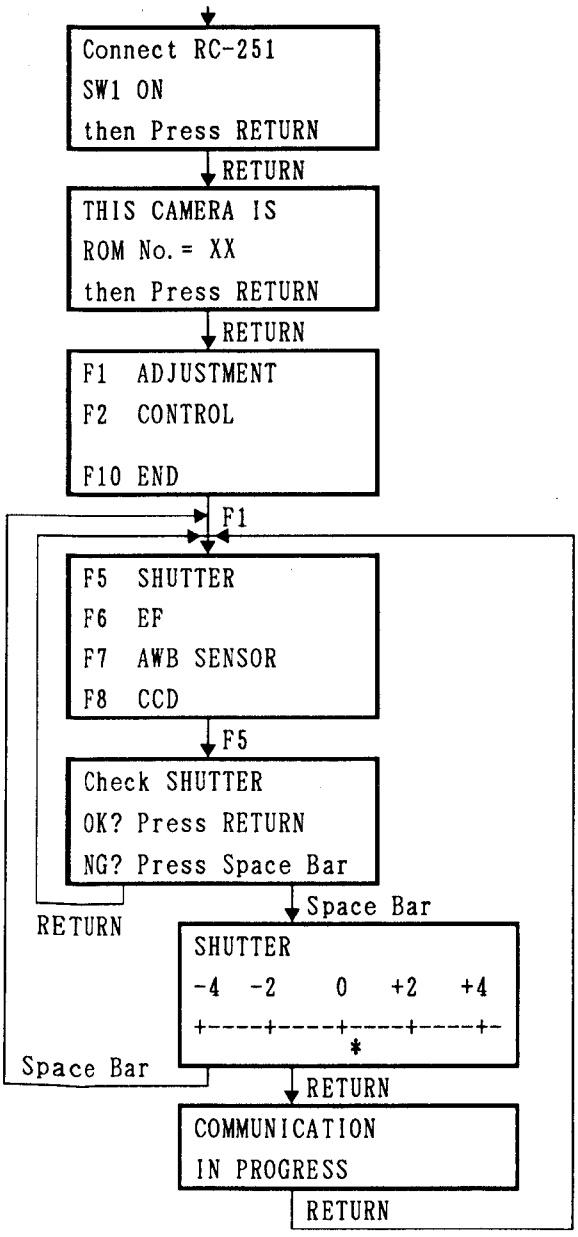
Data writing in progress

As the RC-251 will automatically be in SW1 status, set EF500 to EV9, then press the RETURN KEY.

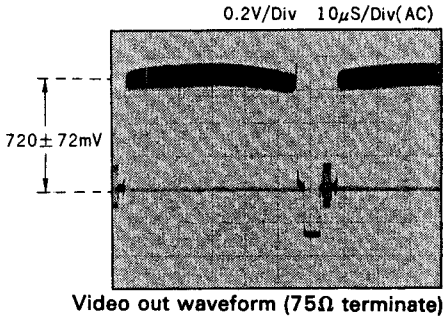
Data writing in progress

ADJ.7 Shutter adjustment (after ALC and AE adjustments)

- Objective: This adjustment is to provide the appropriate exposure with the brightness of EV8 – EV18.
- Tools used: Tool set for data writing, VF for recording, oscilloscope, EF500.
- Standard: 720 ±72mV (Recording while pressing the backlight button at the brightness of EV15)
- Method of adjustment:
  Using EF500 (K value: 12.5), take several photographs while pressing the backlight button at the brightness of EV15. Measure the luminance signal (Video out terminal 75 ohm) at playback using an oscilloscope.
  When the value measured is other than the standard (648 – 792mV), adjust using the multipletool. After adjustment, take normal photographs at each of the brightness levels of EV9, 12, and 15, then confirm luminance signals at playback in the range of 360 – 640mV.

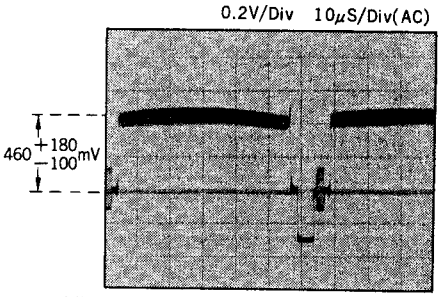


• Adjustment



Video out waveform (75Ω terminate)

• Confirm (taking normal photographs at brightness of EV9, 12 and 15 levels.)



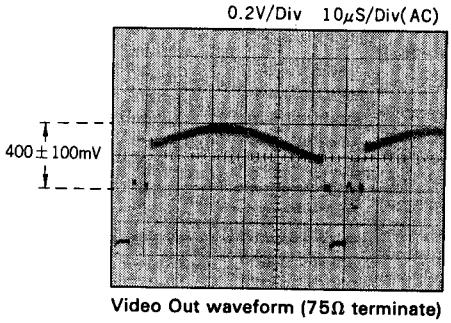
Video out waveform (75Ω terminate)

Using the cursor key set the asterisk mark * to the correction value, then press the RETURN KEY. (Criterion: +1 cursor +70 mV)

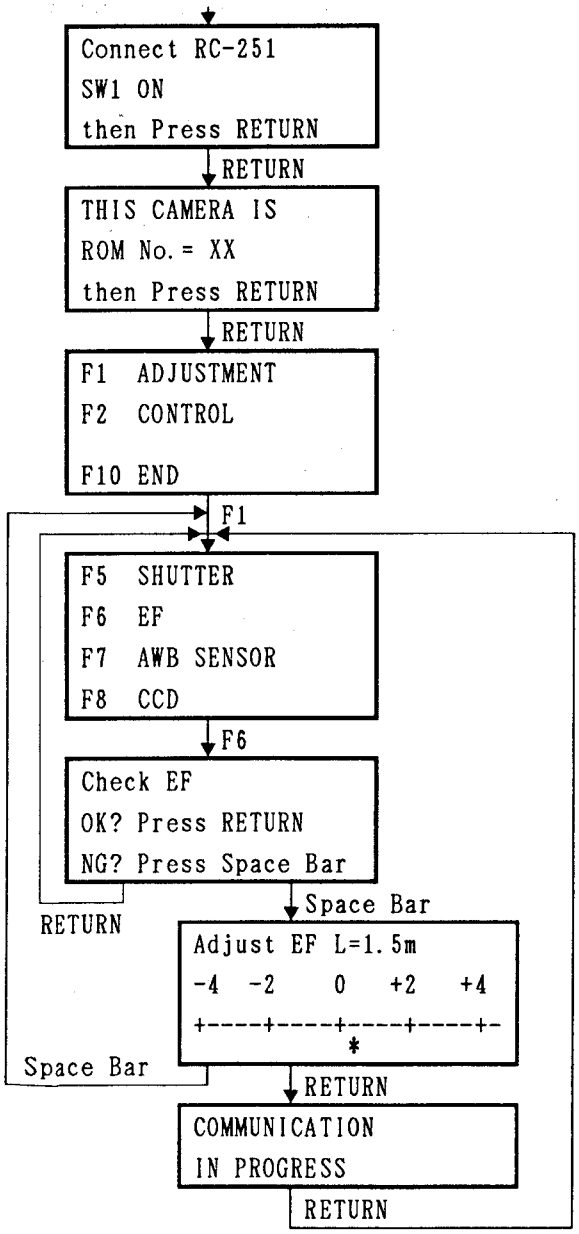
Data writing in progress

ADJ.8 Flash light adjustment (after ALC, AE sensor and shutter adjustment)

- Objective: This is to obtain an appropriate exposure of within 3.0 m when using the flash.
- Tools used: Tool set for data writing, VF for recording, oscilloscope, standard reflecting plate (18%)
- Standard: 400 ±100mV (normal recordings with flash operating, the standard reflecting plate at a distance of 1.5 m, and a brightness of EV8 or less)
- Method of adjustment:
  In a room with a brightness of EV8 or below, operate the flash and make a number of video recordings with a standard 18% reflecting plate (Height: 1 m or more, width: 2 m) at a distance of 1.5 m. Playback the recordings and measure the luminance signals (Video Out terminal 75 ohm) with an oscilloscope (as shown in the waveform photograph, measure to the center of the waveform from the pedestal). When the values are other than the standard (300 – 500mV), adjust using the multiple tool.



Video Out waveform (75Ω terminate)

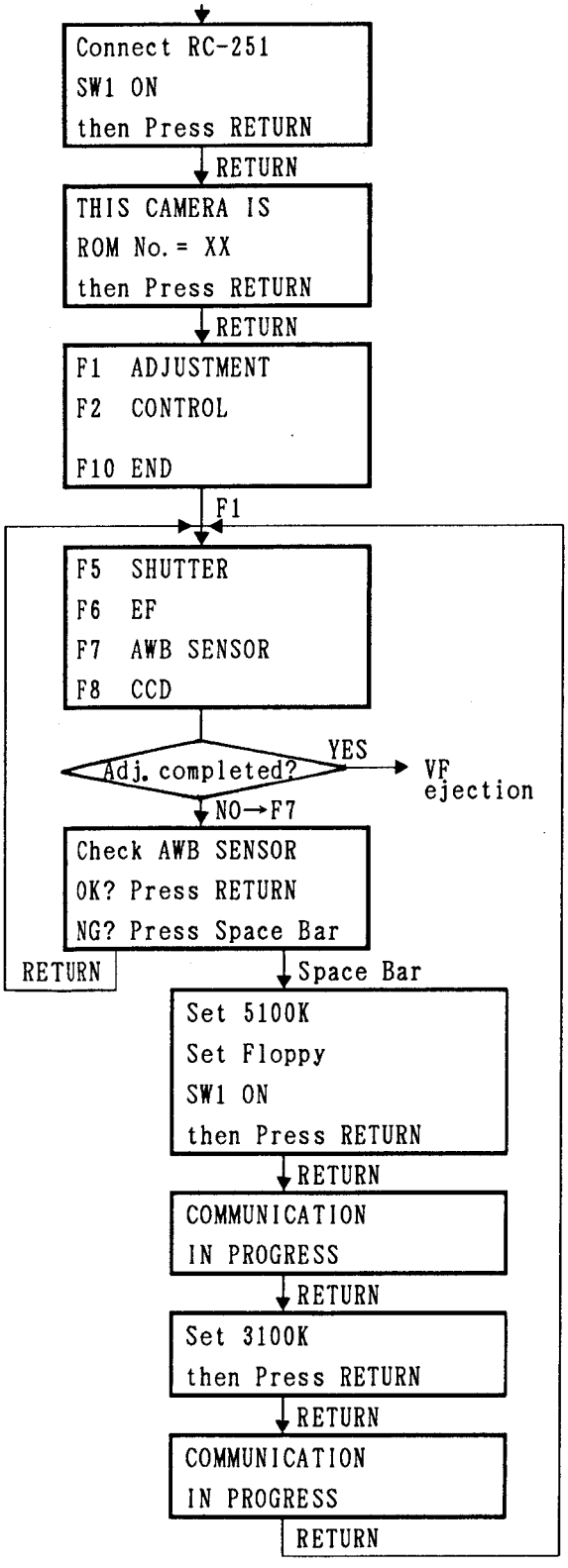


Using the cursor key set the asterisk mark * to the correction value, then press the RETURN KEY. (Criterion: +1 cursor +40 mV)

Data writing in progress

ADJ.9 AWB sensor adjustment

- Objective: This adjustment ensures that white remains white.
- Tools used: Tool set for data writing, VF for recording, Color viewer (5100°K, 3100°K)
- Method of adjustment:
  Set each color viewer (5100°K, 3100°K) in accordance with the instructions of the personal computer.



When the display shown at the left appears, place an unrecorded VF in the RC-251. Next, attach the RC-251 to the bright surface of a color viewer (5100°K), then press the RETURN KEY while pressing SW1. (If the VF is not placed in the camera, the AWB circuit does not operate.)

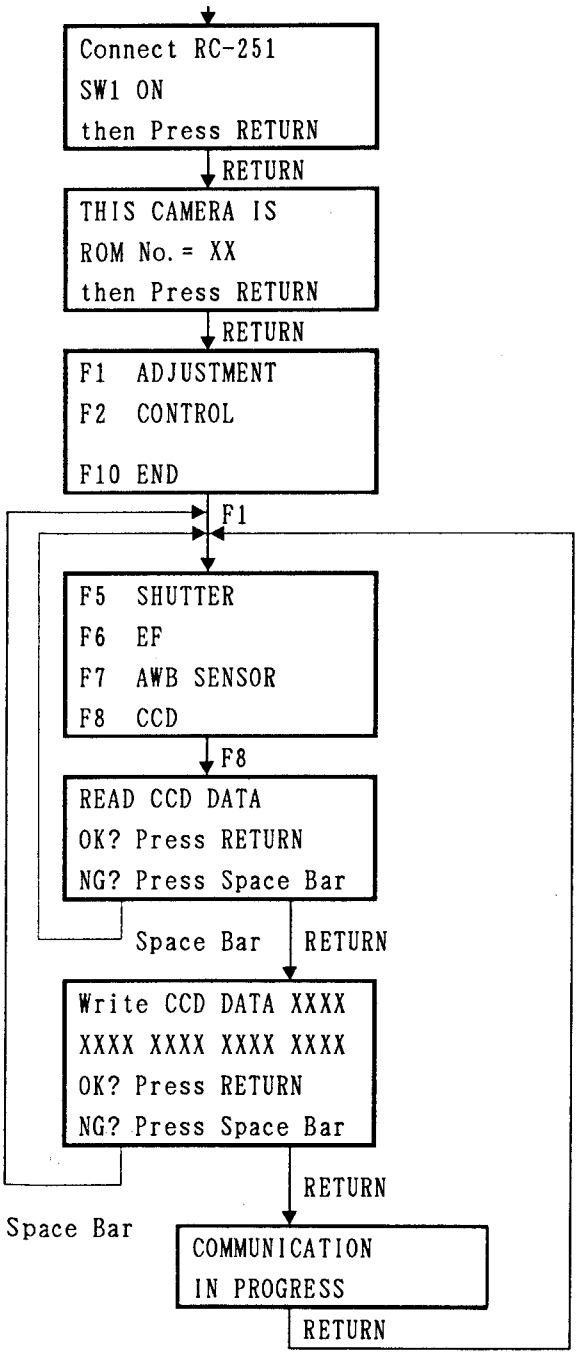
Data writing in progress

As the RC-251 remains in SW1 status, replace the color viewer with a 3100°K color viewer, then press the RETURN KEY.

Data writing in progress

ADJ. 10 CCD defect correction

- Objective: This is correcting the white or black picture element defects in the CCD.
- Tools used: Tool set for data writing
- Method of adjustment:



Before replacing the system control C.B.A., begin reading the CCD data.

The electrical adjustment tool automatically begins reading CCD data.

※ If a fault exists in the system control C.B.A. rading may not be performed.

※ If the system control C.B.A. is replaced by a service part, all the F display will appear.

CCD data writing is performed. After input is completed, the following display appears.

※ When data is unclear, input all F.
If the inputted CCD data is correctly input, press the RETURN KEY.

Data writing in progress

ADJ. 11 Data writing of disk drive

- Objective: Data writing adjustment so that the disk drive operates normally.
- Tools used: Tool set for data writing
- Method of adjustment:
  Data contents to write to E²PROM of the system control C.B.A. differ according to whether the disk drive unit uses the fixed pad method or Bernoulli plate method.
  Because of this, the type should be judged accurately from the external appearance of disk drive, main unit classification number, etc. (Regarding classification, service response, etc., refer to page 34, 35, "Preliminary Instructions".)

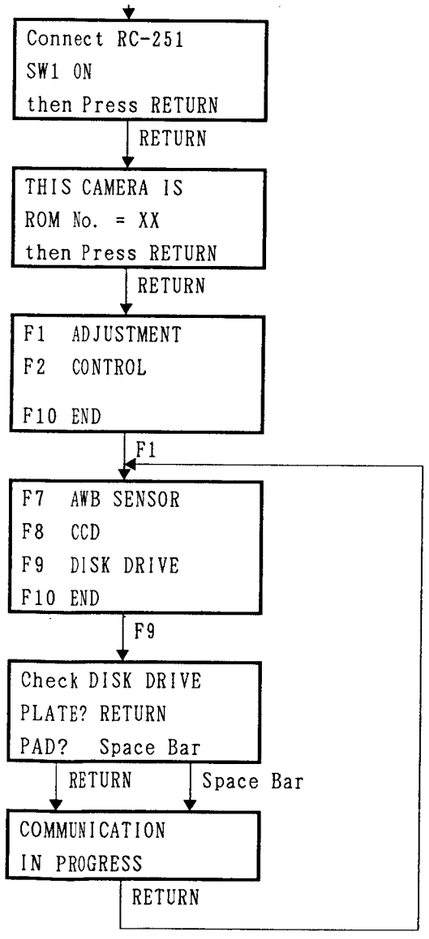
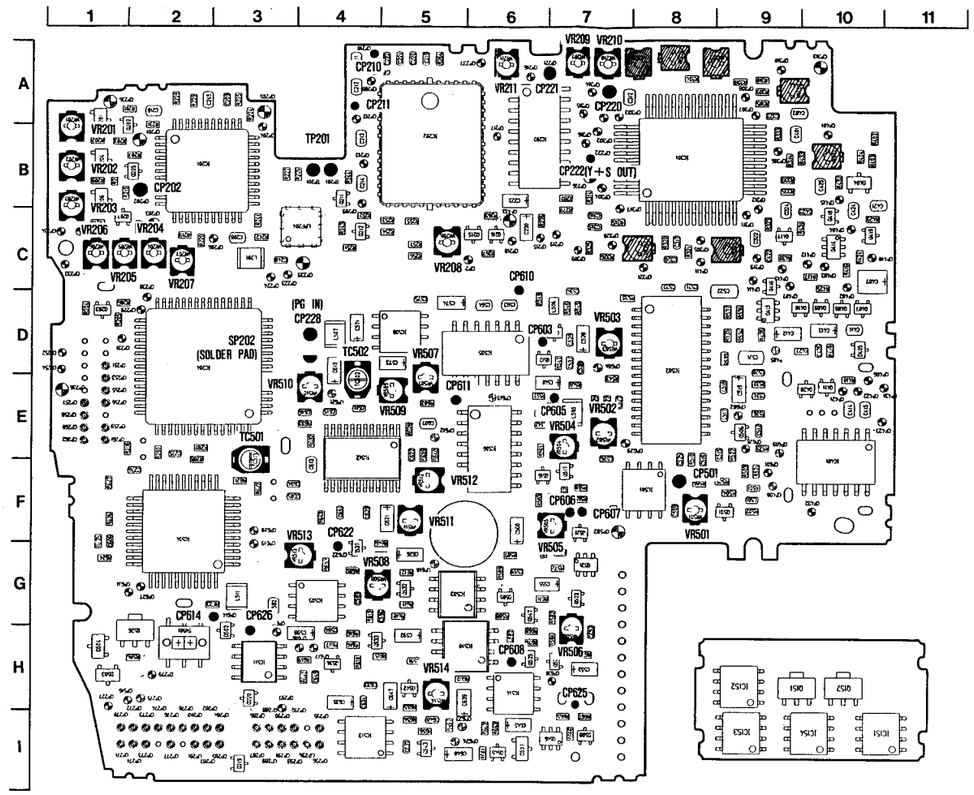


PLATE: Bernoulli plate method disk drive unit
PAD : Fixed pad method disk drive unit

5-4. Measurement and Adjustment Locations

(1) Video process C.B.A. (Classification A ~ F)



Note: As special measuring instruments and tools are needed to adjust the volume of the items indicated by the ▨ mark, be sure not to touch them.

6. OPERATION CHECKS

(1) Checking operating parts

- Main switches (LOCK, PLAY, REC)
- Release buttons (SW1, SW2)
- Flash switches (OFF, AUTO, ON)
- Exposure correction button
- Photographing mode button
- Macro switch
- Eject button
- FWD button
- REV button

} All operations should function normally.

(2) VF related (when recording)

- Not loaded ——— 00 1Hz flicker
- VF loaded prohibiting recording ——— Pr 1Hz flicker
- Photographing completed on all tracks ——— 50 1Hz flicker

} Cannot be released

(3) Continuous photographing speed

- S (signal) ——— Photographing 1 picture
- C (continuous) ——— Continuous photographing at 3 pictures/second

(4) Recording and reproduction

- Checking to see that the exposure is appropriate and the color balance is obtained by taking photographs in various conditions, including indoors, outdoors and using the flash, and reproducing them.

(5) Lens focus

- Normal photographing ——— Focusing from 1m – ∞
- Macro photographing ——— Focusing at 30cm ± 5cm

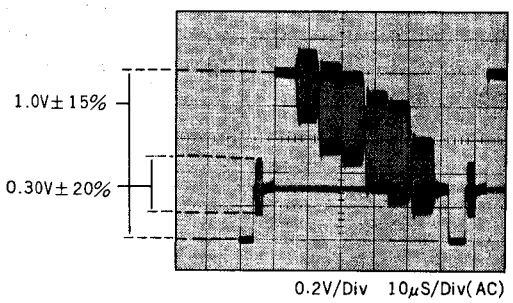
(6) Electric current consumed

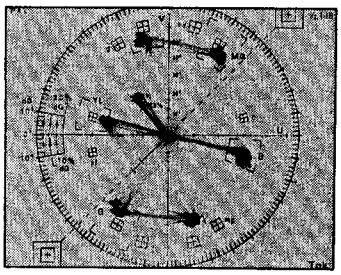
(When LOCK)		Below 70 μA
(When REC)	Standby	Below 70 μA
	SW1 on	Below 600 mA
	Peak at release	Below 2 A
	When initializing	Below 1.4 A
(When PLAY)	When reproducing	Below 460 mA
	When FWD and REV	Below 1.4 A
	When erasing	Below 1.4 A
(During FLASH)	Charge peak	Below 2 A

*Measurement conditions:
Constant voltage and current, impressed voltage of 8.0V, and normal temperature

(7) Picture quality check

Standard VF	Mode	Measuring point	Standard	Measuring apparatus
Color bar	PLAY	Video Out (75 Ω terminal)	See below	Oscilloscope, vectorscope





Standard	Sync tip – White peak	1.0V ± 15% (0.85 – 1.15V)
	Burst level	0.30V ± 20% (0.24 – 0.36V)
	Chroma level, phase	Luminance points should be within each of the vectoroscope sectors. Level → within 20%, Phase → within ±10%
	Horizontal resolution:	350 TVs (at standard monoscope playback) 300 TVs (at recording and playback)

(8) Error display

Errors will be displayed in the LCD in the following circumstances.

Error display state	When rec	When play	When erase	When initializing
Servo not stable	O	O	O	O
No PG signal	O			
No FG signal	O	O	O	O
CCD clearing does not end	O			
Flash charging does not end	O			
Shutter opening operation does not end	O			
Shutter data is defective	O			

7. MAINTENANCE

7-1 Head Cleaning

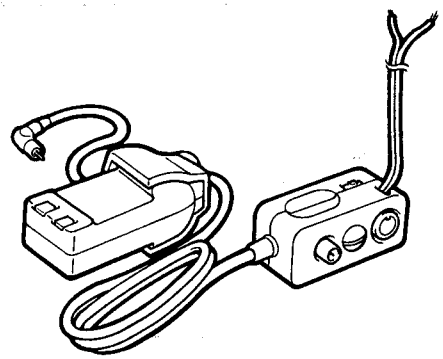
For this purpose use a VF-CD head cleaning sheet. Be sure to read the instruction manual for VF-CD before using this head cleaning sheet. If the screen has white noise and the damage is not thought to be related to the panels, clean the head with a wire rod moistened with cleaning liquid.

7-2 Head Replacement

If the head is used for a long time (more that 700 hours), the output deteriorates due to it wearing out. As a result the reproduced pictures look rought, so it is necessary to replace the head. However, as it is not possible during servicing to carry out the required head adjustments after replacement, the disk drive itself should be replaced as a unit.

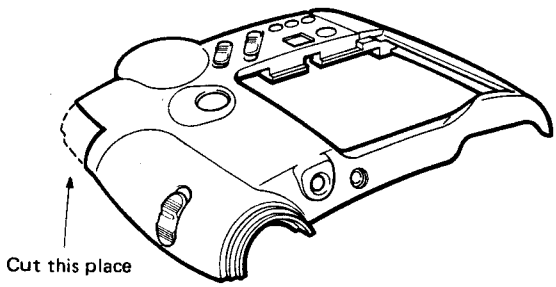
8. APPENDIX (USE OF OWN TOOLS)

8-1 Tool Battery



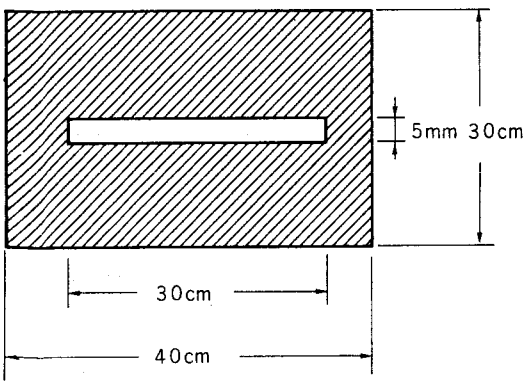
By soldering lead wires to the (+) and (−) lines as shown in the diagram using the AV-C25 AC coupler, it is also possible to supply voltage from a constant voltage power source.

8-2 Tool Top Cover



The lead wires for the electrical adjustment tool and so on can be taken out having cut the top cover as in the diagram.

8-3 Slit Plate



A slit of 5 mm is opened up near the center of black picture paper of the same size as the Stnadard Color Viewer.

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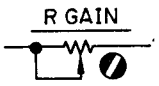
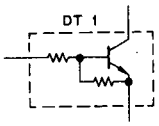
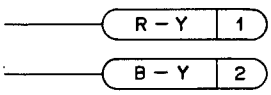
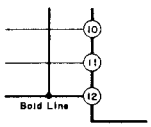
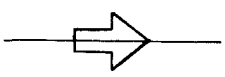
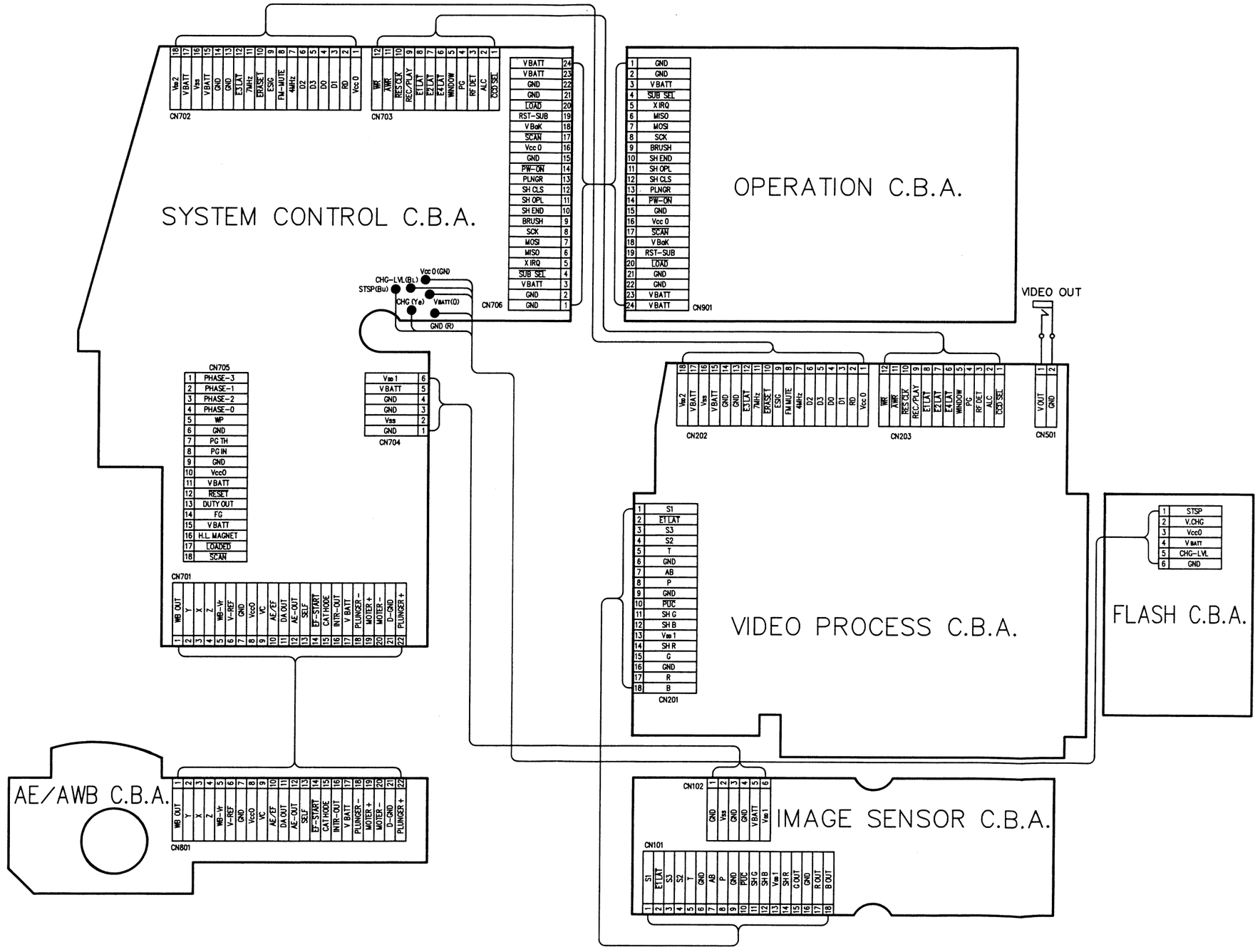
EXPLANATION OF ELECTRIC DIAGRAM

- ⚠:Parts bearing this make are critical to safe operation of the equipment. Use only the specified parts when replacing them.
- Unless otherwise specified, refer to the Ω indicator for resistors.,
- Unless otherwise specified, refer to the μF/V indicator for capacitors.
- Unless otherwise specified, refer to the μH indicator for inductances.
- The colors used on the patterns indicate the following.
  Yellow:Front soldering pattern
  Blue :Back soldering pattern
  Black :Mounted parts of each pattern
- Unless otherwise indicated, recording system waveforms are those due to generation of part of a color bar chart(5100° K).
- Unless otherwise indicated, playback system waveforms are those due to playback of a standard video floppy disk(Color bar).
- All waveforms are for reference only, not absolute standards.

Explanation of circuit diagram

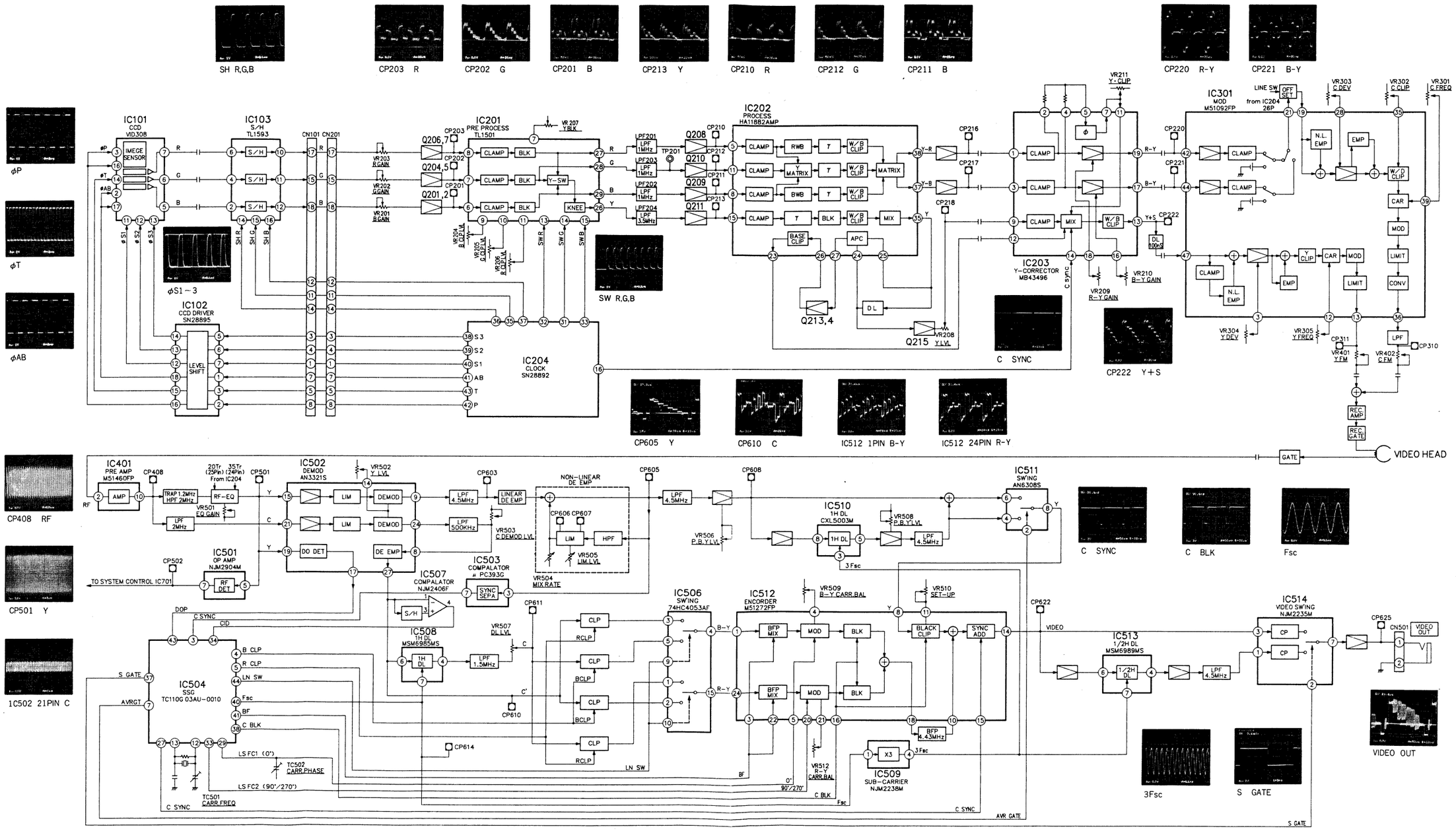
	Internal volume control.
	Transistor with built-in resistors.
	Shows separation in circuit diagram of same C.B.A.
	Ground line.
	Display the signal flow.

1. INTERCONNECTION DIAGRAM



2. BLOCK DIAGRAM

2-1. VIDEO PROCESS



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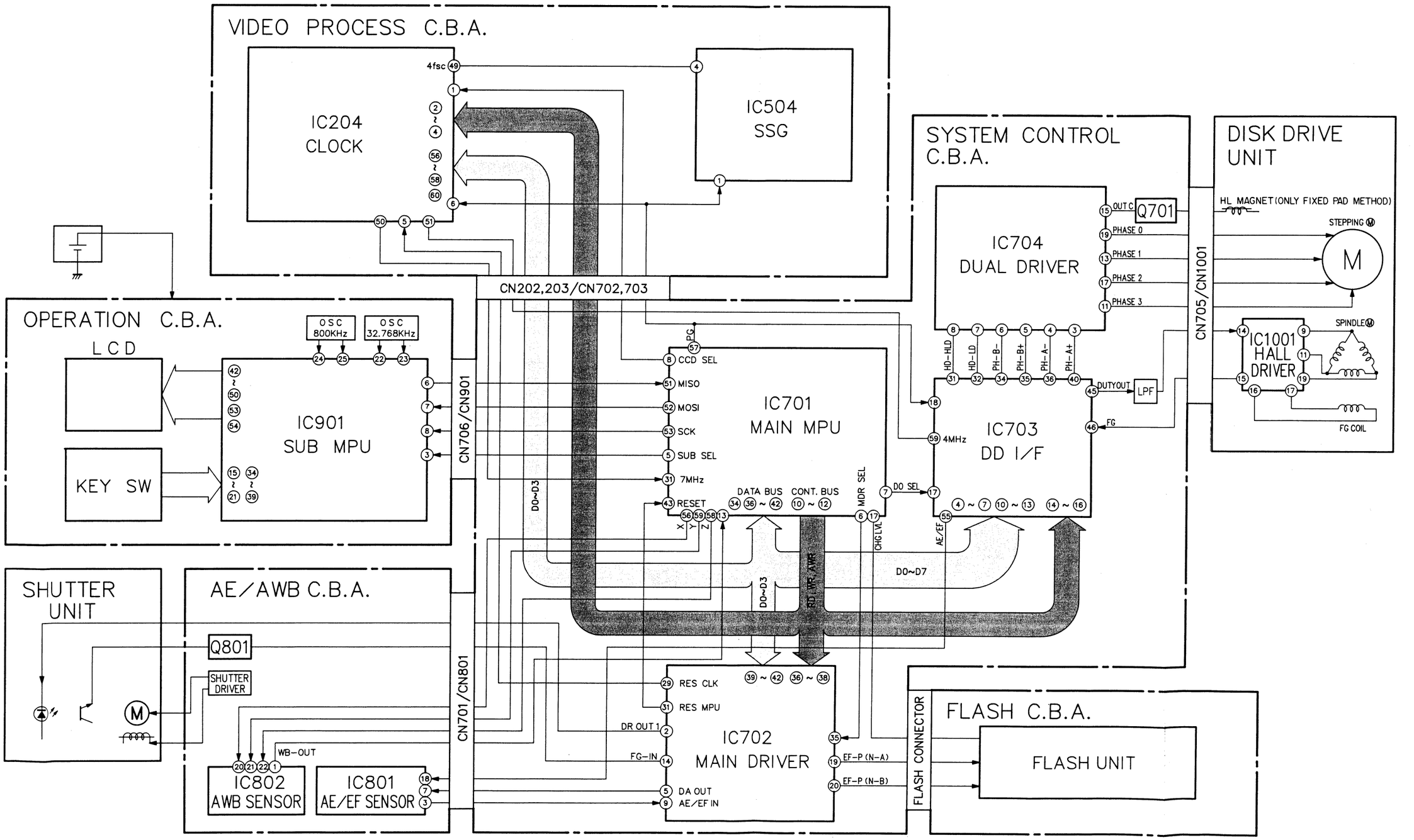
2-2. SYSTEM CONTROL



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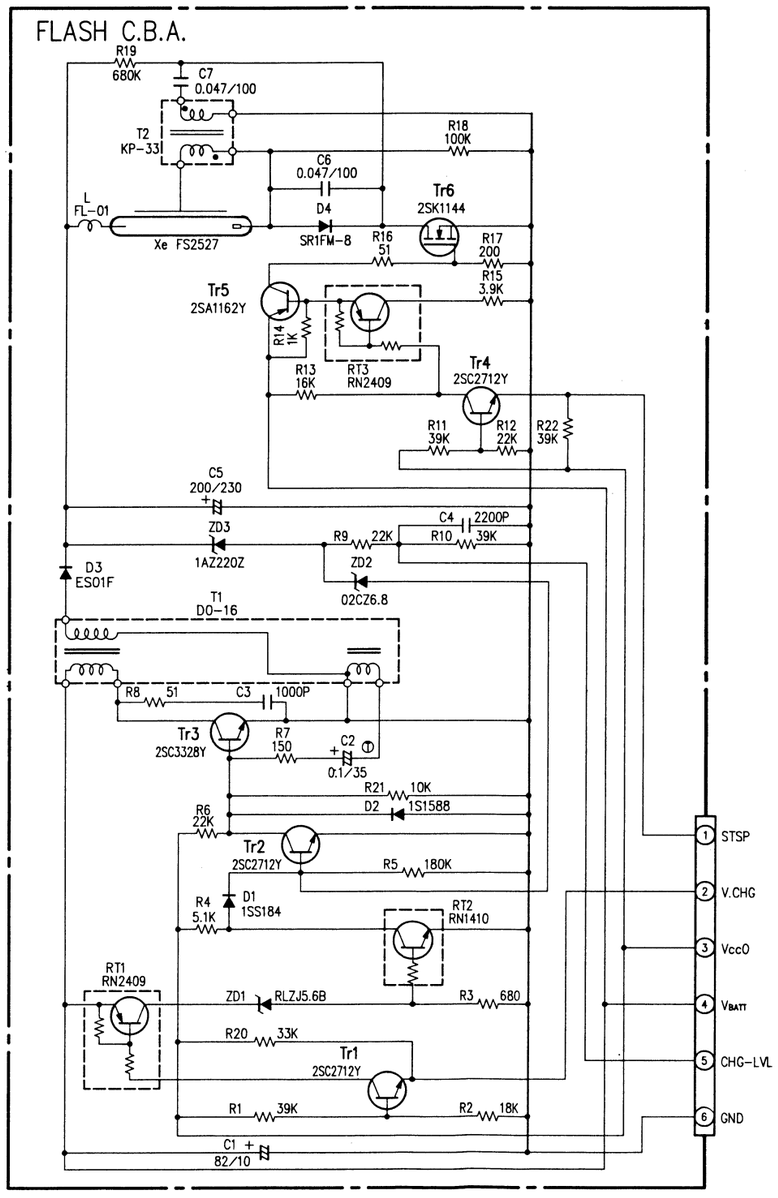
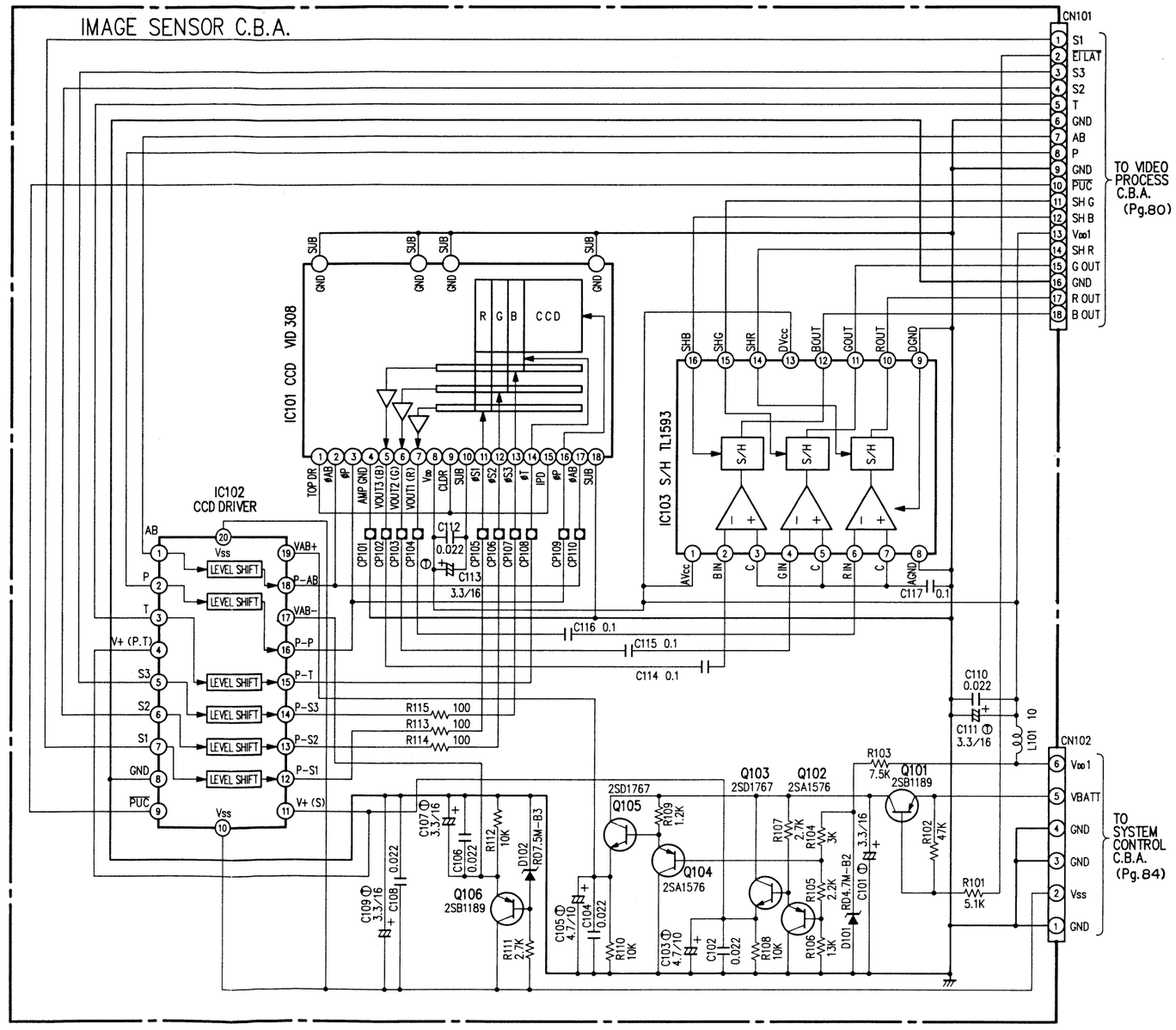
3. SCHEMATIC DIAGRAM AND PATTERN

3-1. FLASH C.B.A. SCHEMATIC DIAGRAM



3-2. IMAGE SENSOR C.B.A. SCHEMATIC DIAGRAM



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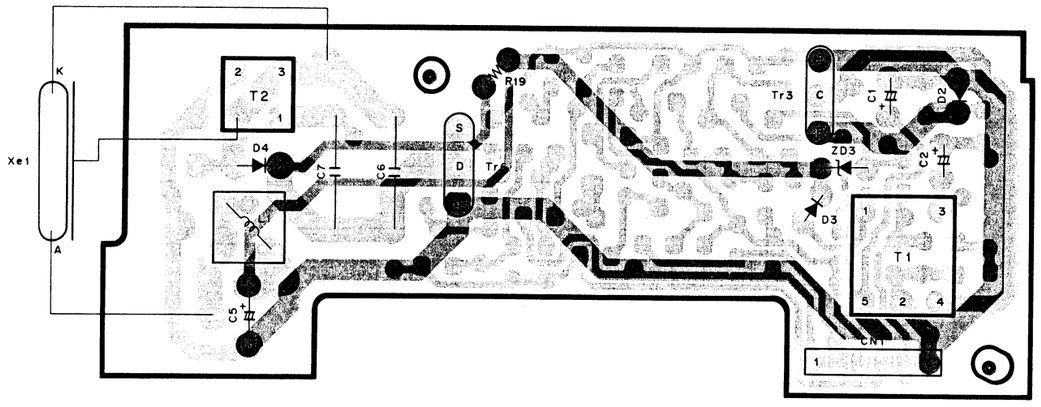
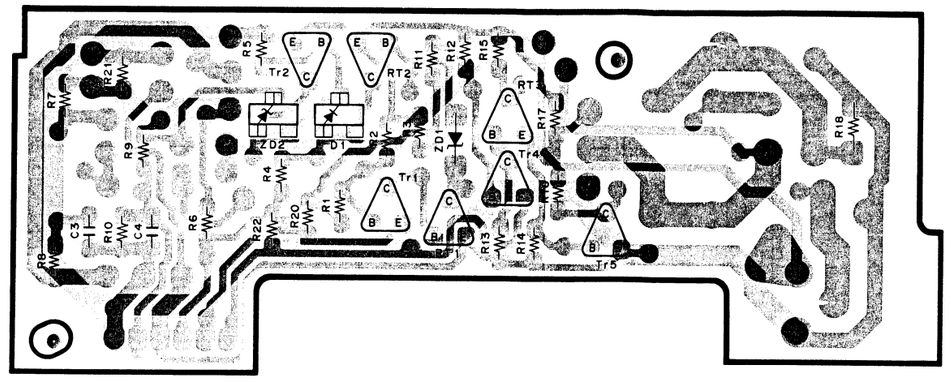
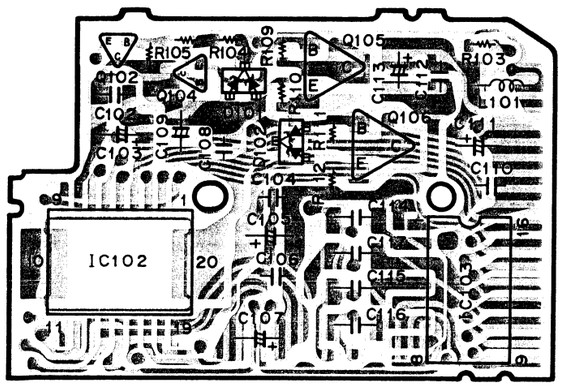
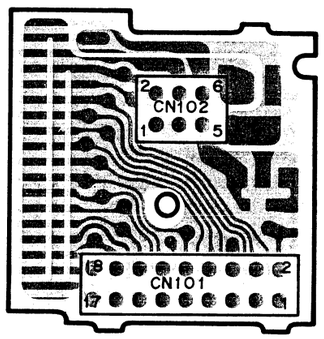
3-3. FLASH C.B.A. PATTERN

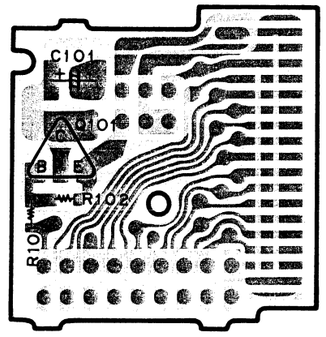


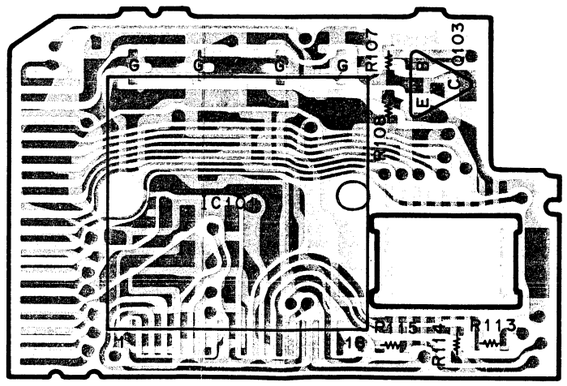


3-4. IMAGE SENSOR C.B.A. PATTERN









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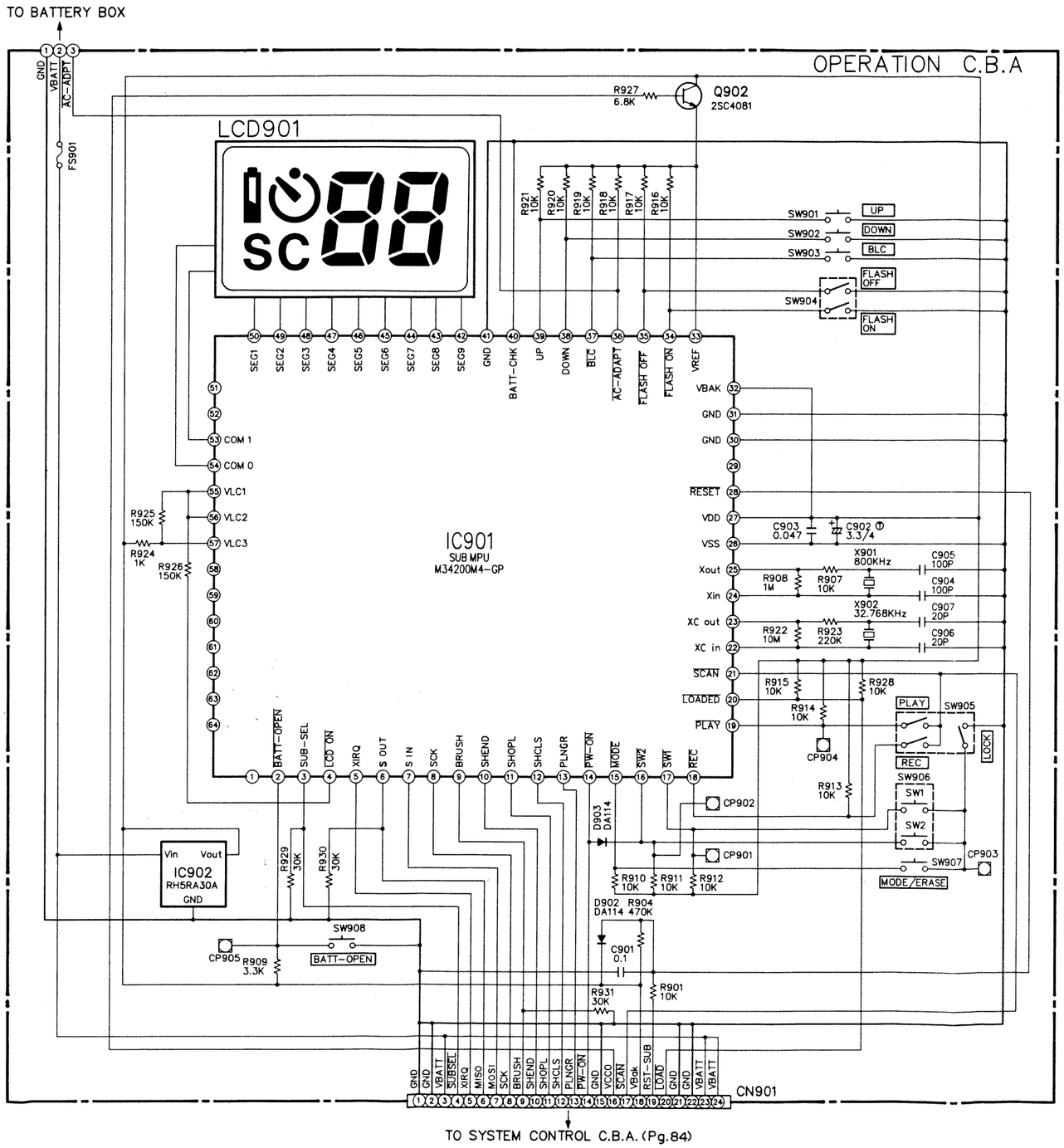
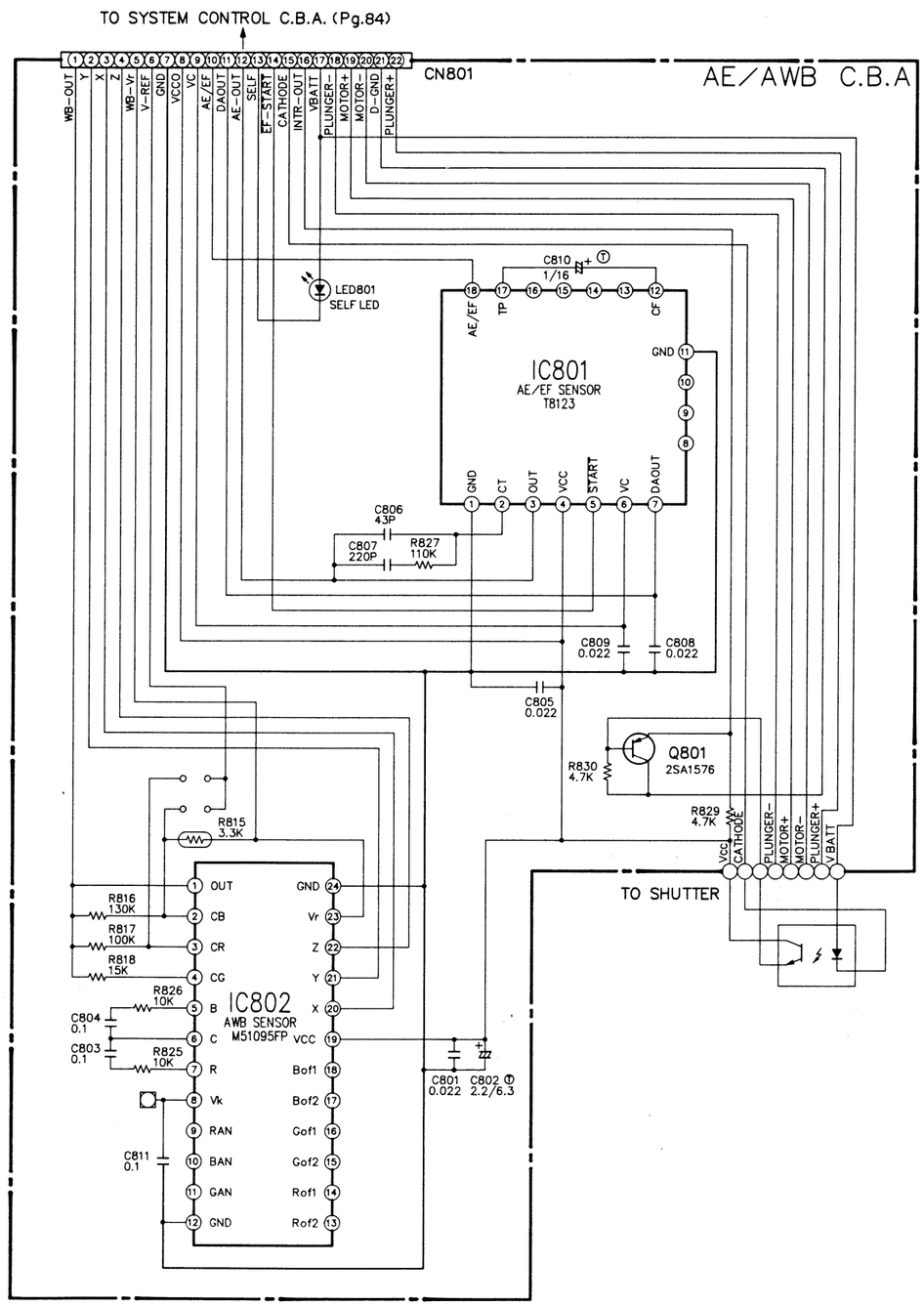
3-5. OPERATION C.B.A. SCHEMATIC DIAGRAM



3-6. AE/AWB C.B.A. SCHEMATIC DIAGRAM



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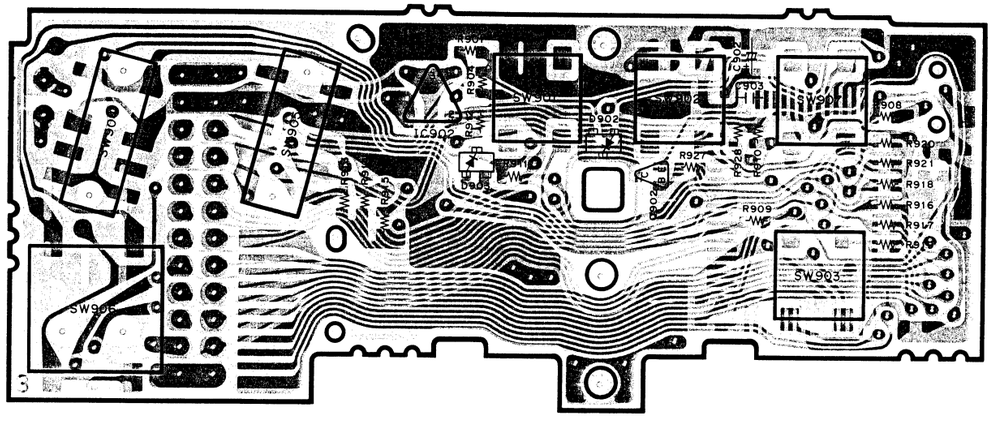
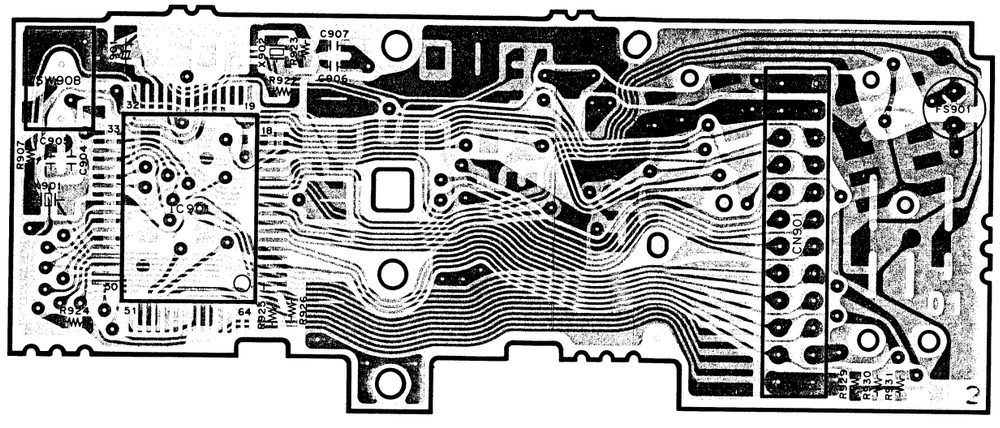
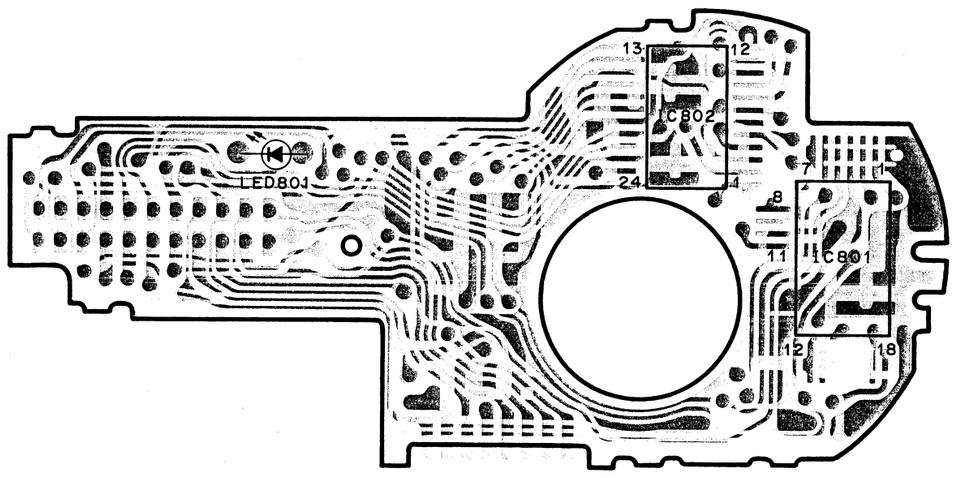
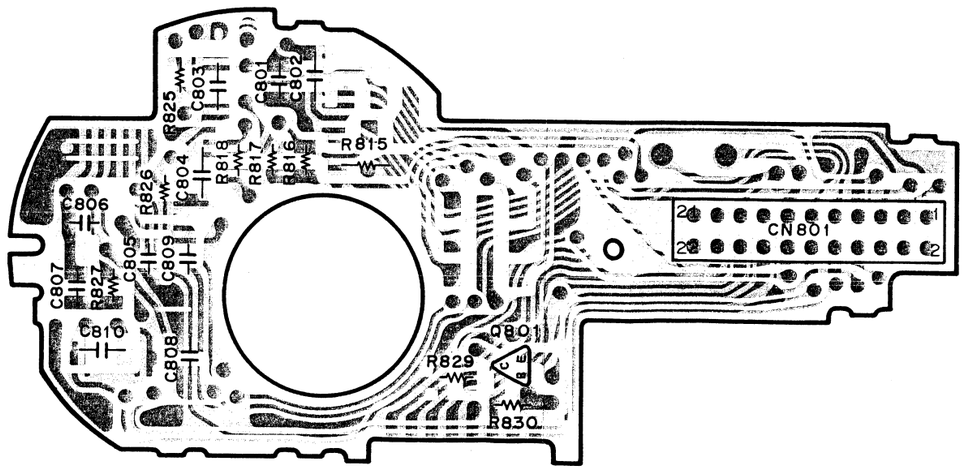
3-7. OPERATION C.B.A. PATTERN





3-8. AE/AWB C.B.A. PATTERN





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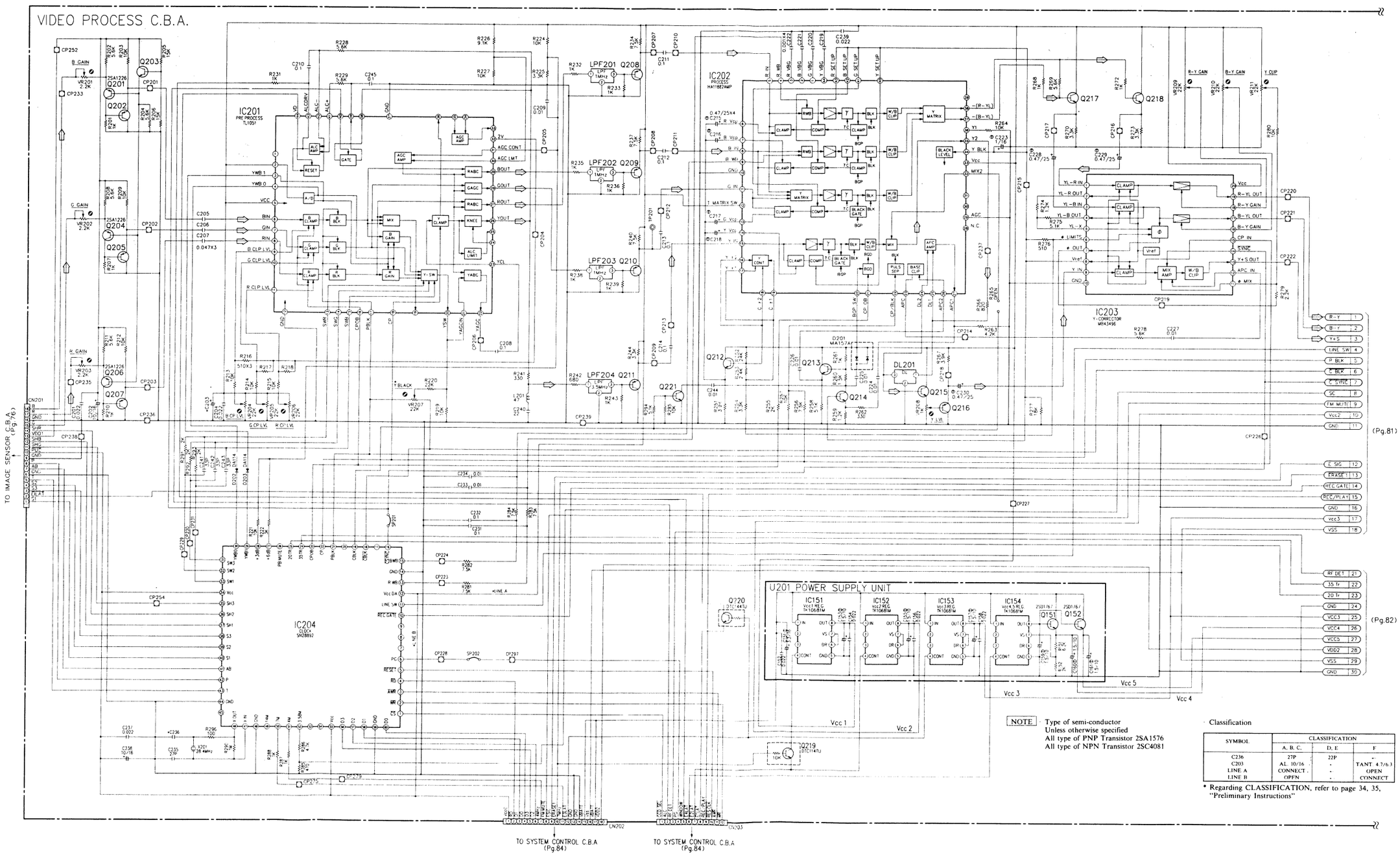
3-9. VIDEO PROCESS C.B.A. SCHEMATIC DIAGRAM (1) (CLASSIFICATION A ~ F)



NOTE · Type of semi-conductor
Unless otherwise specified
All type of PNP Transistor 2SA1576
All type of NPN Transistor 2SC4081

· Classification

SYMBOL	CLASSIFICATION		
	A, B, C,	D, E	F
C236	27P	22P	-
C203	AL 10/16	-	TANT 4.7/6.3
LINE A	CONNECT.	-	OPEN
LINE B	OPEN	-	CONNECT

* Regarding CLASSIFICATION, refer to page 34, 35, "Preliminary Instructions"

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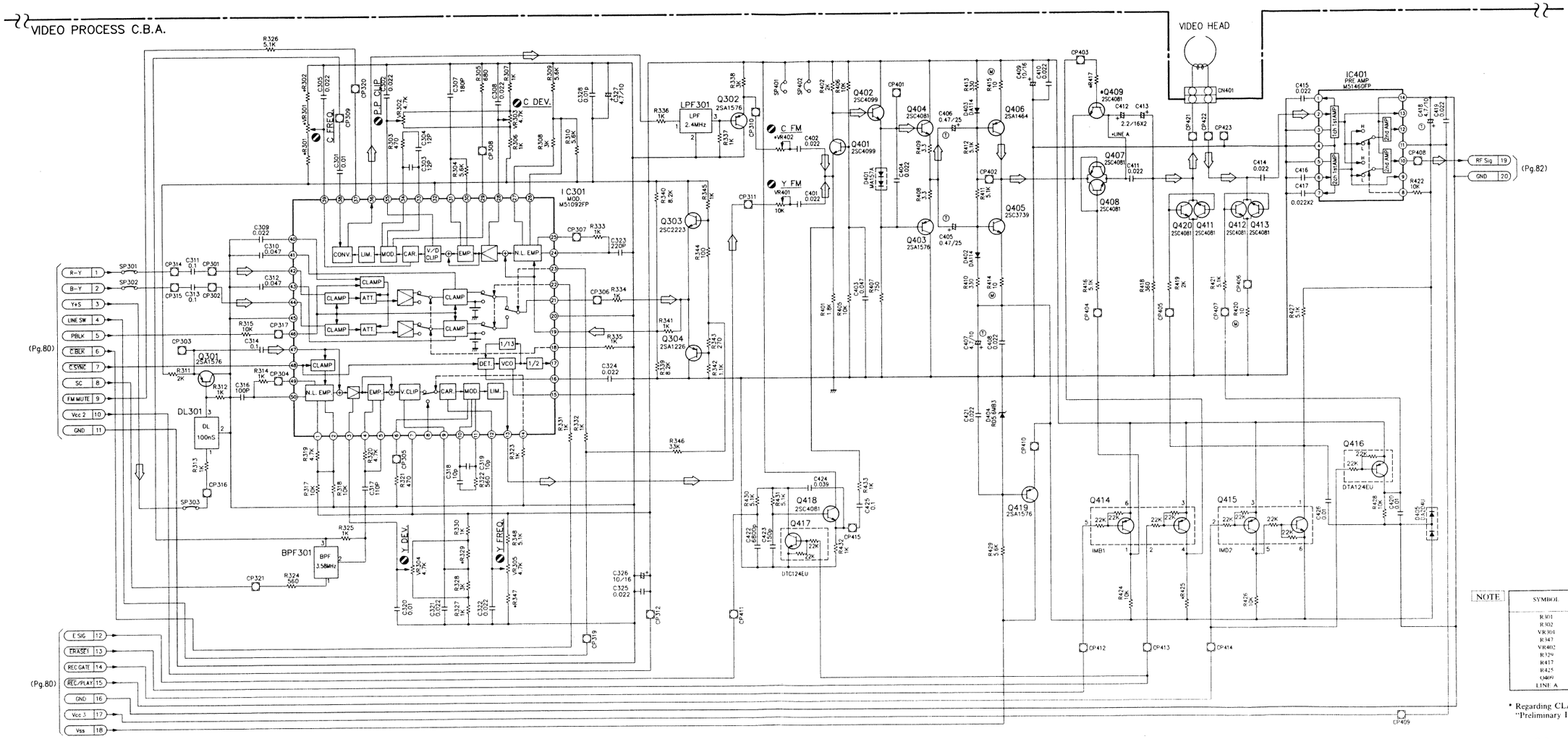
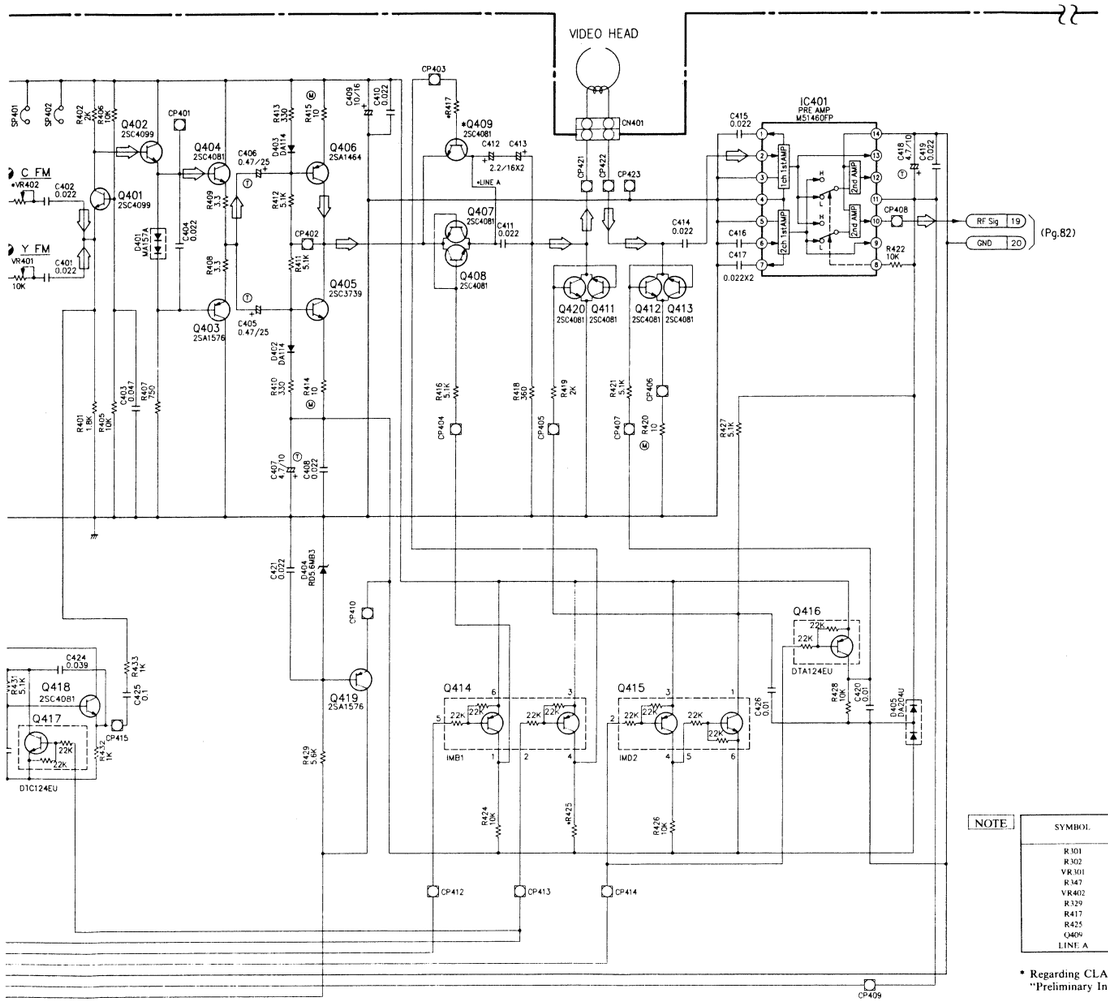
3-10. VIDEO PROCESS C.B.A. SCHEMATIC DIAGRAM (2) (CLASSIFICATION A ~ F)



NOTE	SYMBOL	CLASSIFICATION A, B, C	D, E	F
	R301	3K	4.3K	-
	R302	6.8K	8.2K	-
	VR301	4.7K	2.2K	-
	R347	18K	15K	-
	VR402	22K	47K	-
	R329	3K	-	2.7K
	R417	5.1K	-	OPEN
	R425	10K	-	OPEN
	Q409	2SC4081	-	OPEN
	LINE A	OPEN	-	CONNECT

* Regarding CLASSIFICATION, refer to page 34, 35, "Preliminary Instructions"



NOTE	SYMBOL	CLASSIFICATION		
		A, B, C	D, E	F
	R301	3K	4.3K	-
	R302	6.8K	8.2K	-
	VR301	4.7K	2.2K	-
	R347	18K	12K	-
	VR402	22K	47K	-
	R329	3K	-	2.7K
	R417	5.1K	-	OPEN
	R425	10K	-	OPEN
	Q409	2SC4081	-	OPEN
	LINE A	OPEN	-	CONNECT

* Regarding CLASSIFICATION, refer to page 34, 35, "Preliminary Instructions"

SIGNAL WAVEFORMS (REC Mode)

CN201 1(3.4)PIN S1(S2.S3)
1V/Div 0.1μS/Div

CN201 5PIN T
1V/Div 2μS/Div

CN201 7PIN AB
1V/Div 2μS/Div

CN201 8PIN P
1V/Div 2μS/Div

CN201 11(12,14)PIN SH G(B,R)
1V/Div 0.1μS/Div

CP201 B
0.1V/Div 20μS/Div

CP202 G
0.1V/Div 20μS/Div

CP2C3 R
0.1V/Div 20μS/Div

IC201 13(14,15)PIN SW R(G.B)
1V/Div 0.2μS/Div

IC201 27PIN R
0.1V/Div 20μS/Div

IC201 28PIN G
0.1V/Div 20μS/Div

IC201 29PIN B
0.1V/Div 20μS/Div

CP210 R
50mV/Div 20μS/Div

CP211 B
50mV/Div 20μS/Div

CP212 G
50mV/Div 20μS/Div

CP213 Y
50mV/Div 20μS/Div

CP214 APC
0.1V/Div 20μS/Div

CP216 −(R-Y)
0.1V/Div 20μS/Div

CP217 -(B-Y)
0.1V/Div 20μS/Div

CP218 Y
0.1V/Div 20μS/Div

CP219 Y CORR
50mV/Div 20μS/Div

CP220 R-Y
0.1V/Div 20μS/Div

CP221 B-Y
0.1V/Div 20μS/Div

CP222 Y+S
0.2V/Div 20μS/Div

CP226 C SYNC
2V/Div 20μS/ Div

IC301 19PIN R-Y/B-Y
50mV/Div 20μS/Div

IC204 19PIN C BLK
2V/Div 20μS/Div

IC204 21PIN P BLK
2V/Div 20μS/Div

IC204 22PIN CP
2V/Div 20μS/Div

IC204 23PIN CPOB
2V/Div 20μS/Div

IC204 47PIN X IN(28.6M)
1V/Div 50nS/Div

IC204 49PIN 14M
1V/Div 50nS/Div

IC204 50PIN 7M
1V/Div 50nS/Div

IC204 51PIN 4M
1V/Div 50nS/Div

IC204 52PIN 3.58M
1V/Div 50nS/Div

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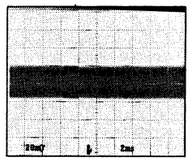
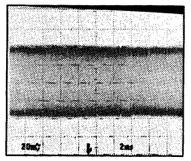
SIGNAL WAVEFORMS (PB Mode)

CP601 RF



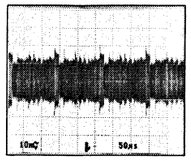
0.2V/Div 2mS/Div

CP501 Y FM



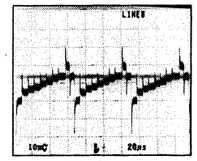
0.2V/Div 2mS/Div

CP602 C FM



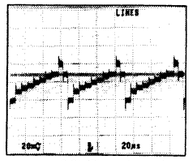
0.1V/Div 50μS/Div

Q510(E) Y



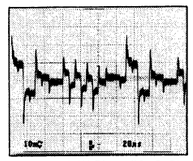
0.2V/Div 20μS/Div

CP603 Y



0.2V/Div 20μS/Div

CP604 C

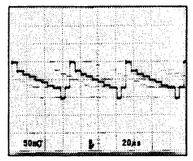


0.1V/Div 20μS/Div

CP605 Y

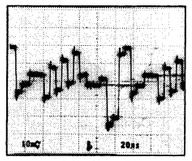
0.5V/Div 20μS/Div

CP608 Y



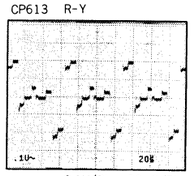
0.5V/Div 20μS/Div

CP610 C



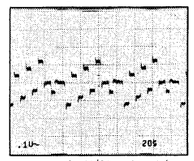
0.1V/Div 20μS/Div

CP613 R-Y



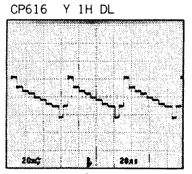
0.1V/Div 20μS/Div

CP612 B-Y



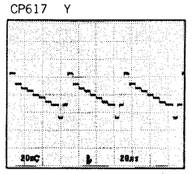
0.1V/Div 20μS/Div

CP616 Y 1H DL



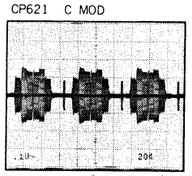
0.2V/Div 20μS/Div

CP617 Y



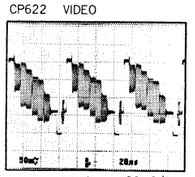
0.2V/Div 20μS/Div

CP621 C MOD



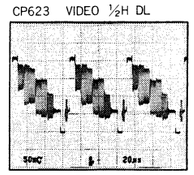
0.1V/Div 20μS/Div

CP622 VIDEO



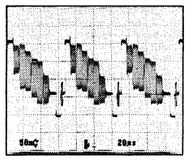
0.5V/Div 20μS/Div

CP623 VIDEO ½H DL



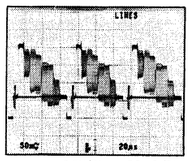
0.5V/Div 20μS/Div

CP624 VIDEO



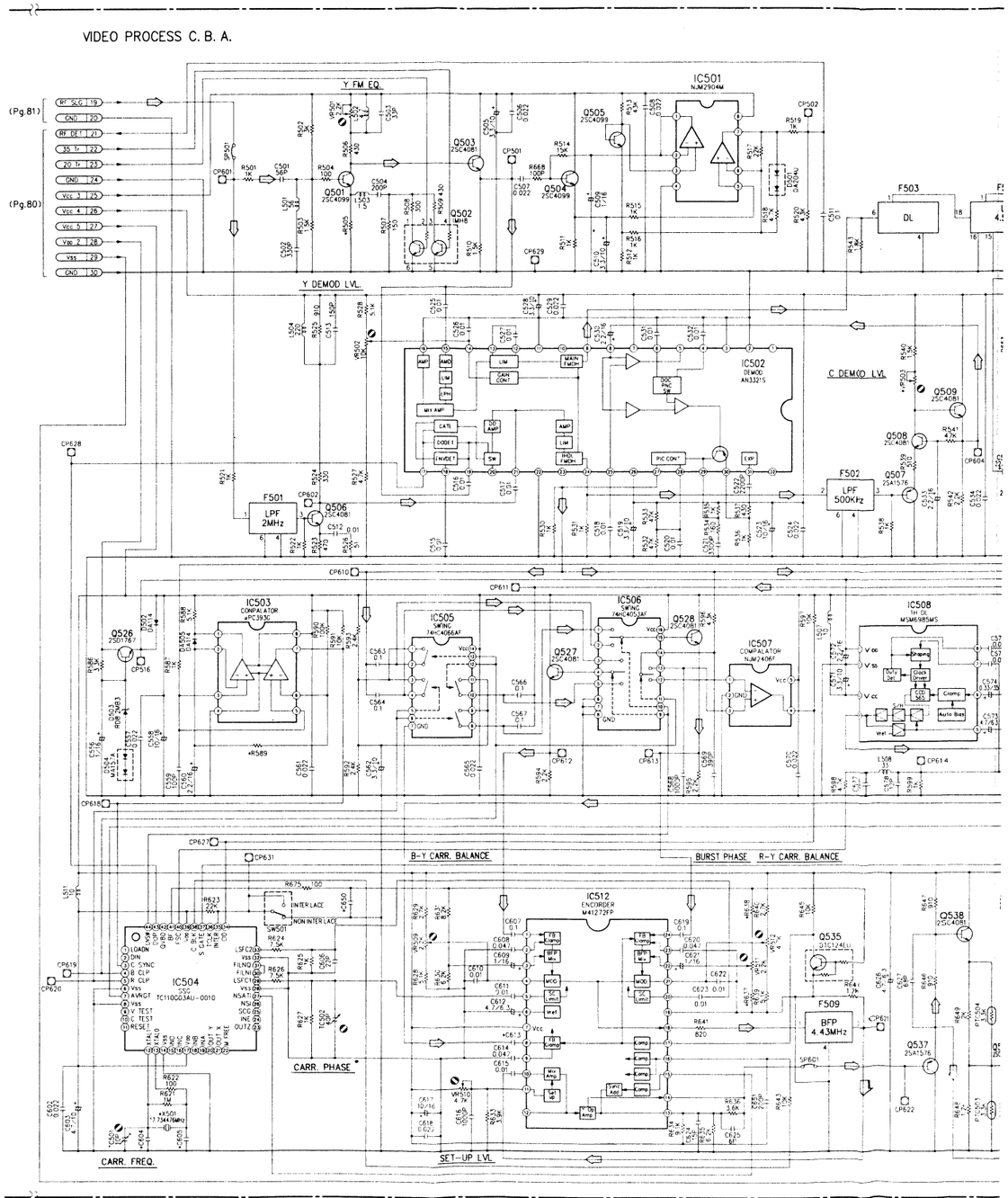
0.5V/Div 20μS/Div

CP625 VIDEO

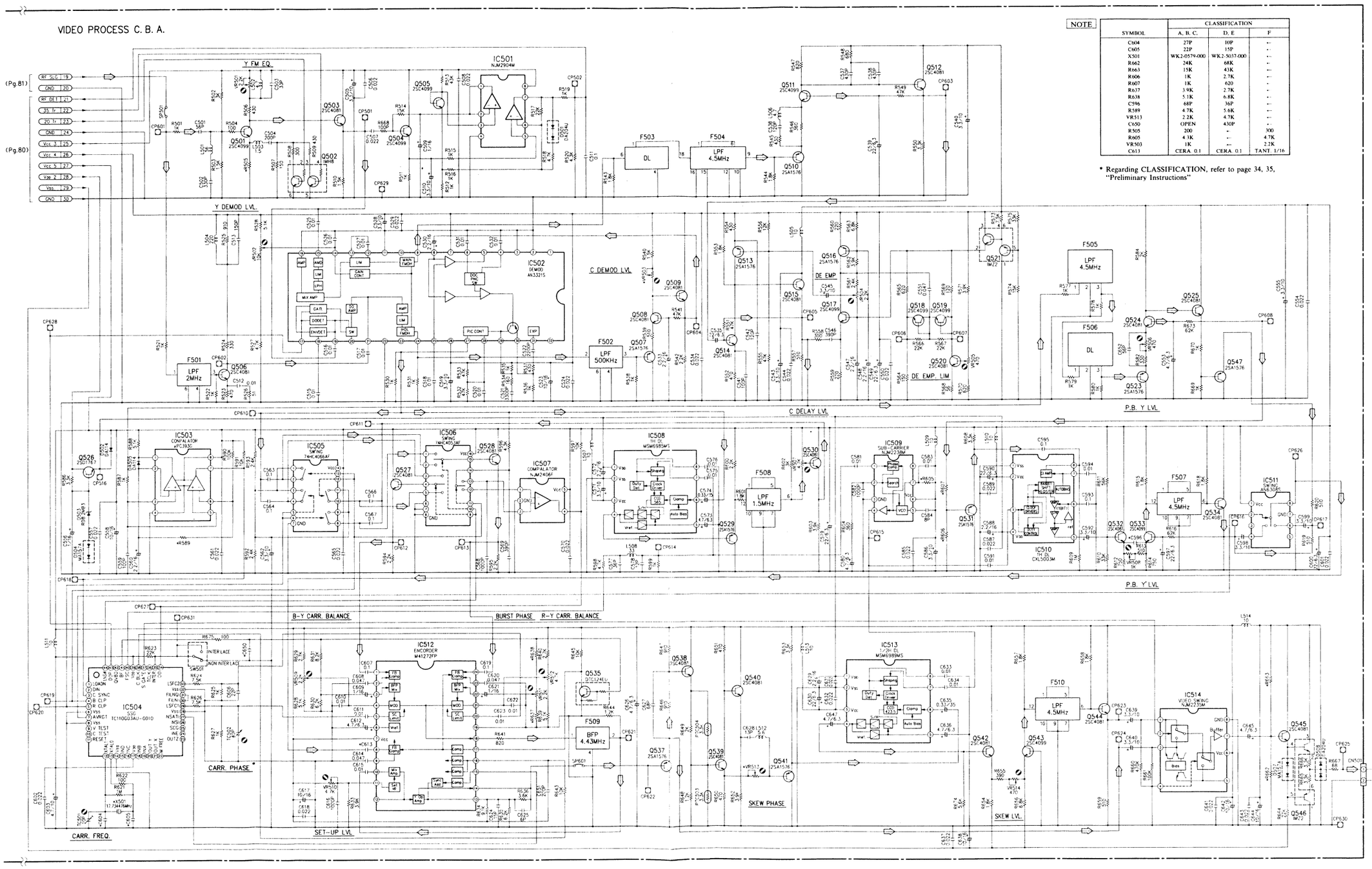


0.5V/Div 20μS/Div

3-11. VIDEO PROCESS C.B.A. SCHEMATIC DIAGRAM (3) (CLASSIFICATION A ~ F)



3-11. VIDEO PROCESS C.B.A. SCHEMATIC DIAGRAM (3) (CLASSIFICATION A ~ F)



NOTE

SYMBOL	CLASSIFICATION A, B, C	CLASSIFICATION D, E	CLASSIFICATION F
C604	27P	10P	-
C605	22P	15P	-
X501	WK2-0579-000	WK2-5037-000	-
R662	24K	68K	-
R663	15K	43K	-
R606	1K	2.7K	-
R607	1K	620	-
R637	3.9K	2.7K	-
R638	5.1K	6.8K	-
C596	68P	36P	-
R589	4.7K	5.6K	-
VR513	2.2K	4.7K	-
C650	OPEN	430P	-
R505	200	-	300
R605	4.3K	-	4.7K
VR503	1K	-	2.2K
C613	CERA 0.1	CERA 0.1	TANT. 1/16

* Regarding CLASSIFICATION, refer to page 34, 35, "Preliminary Instructions"

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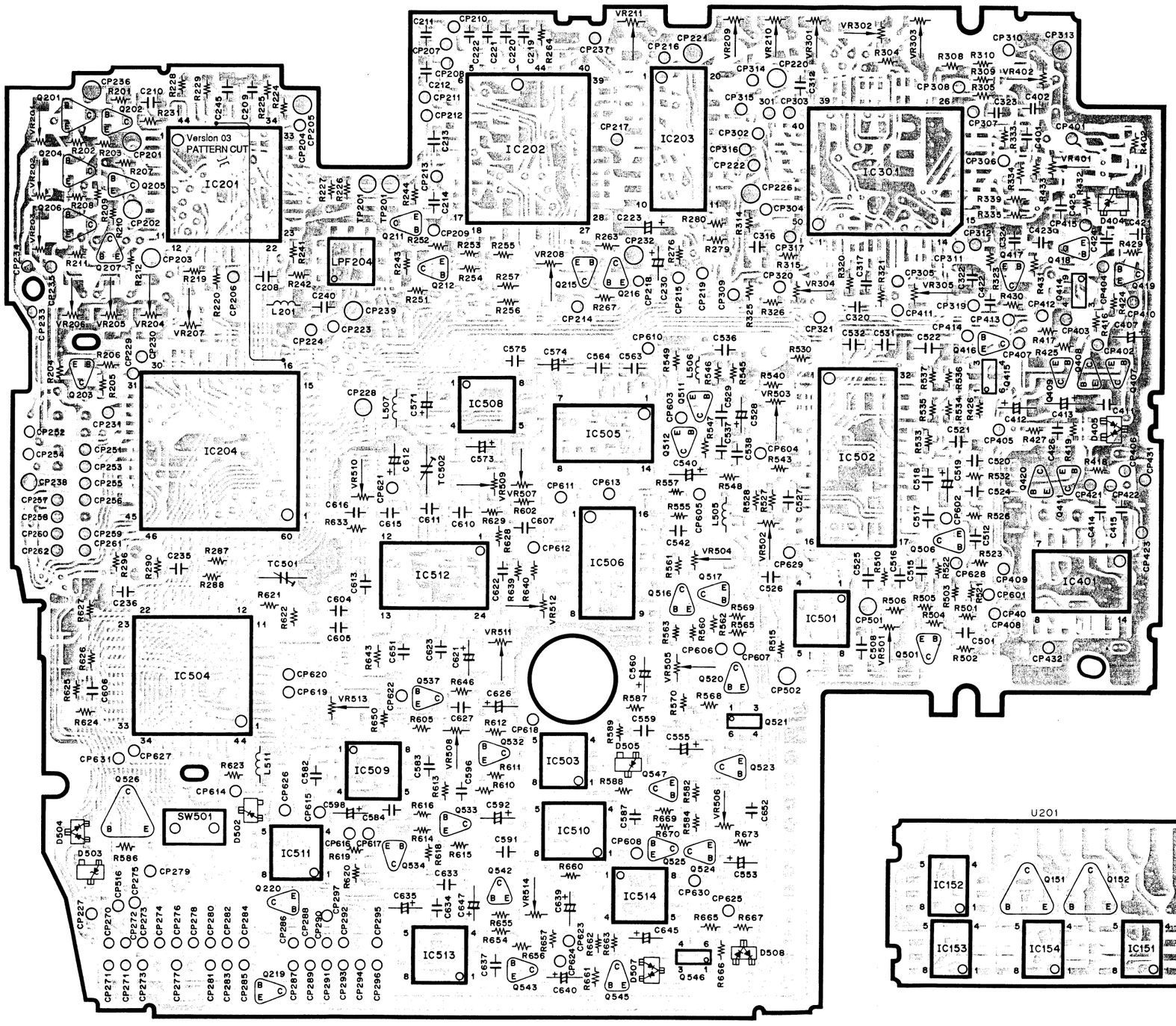
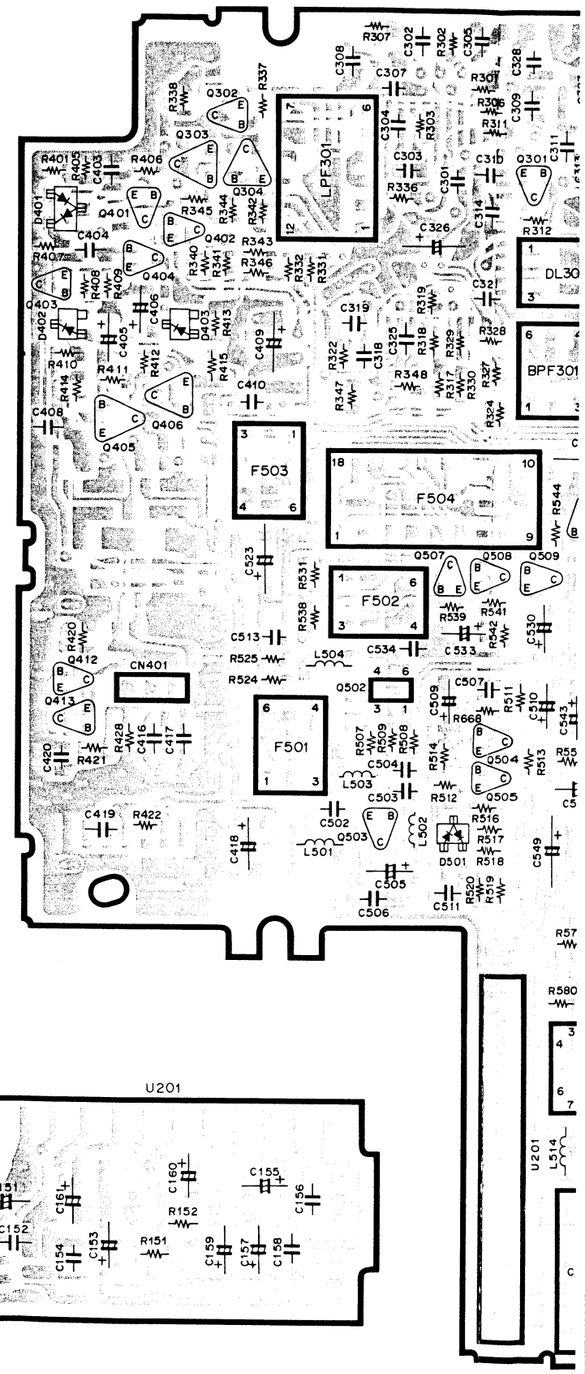
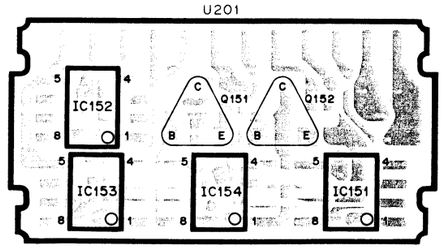
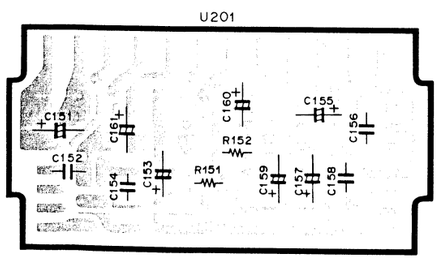
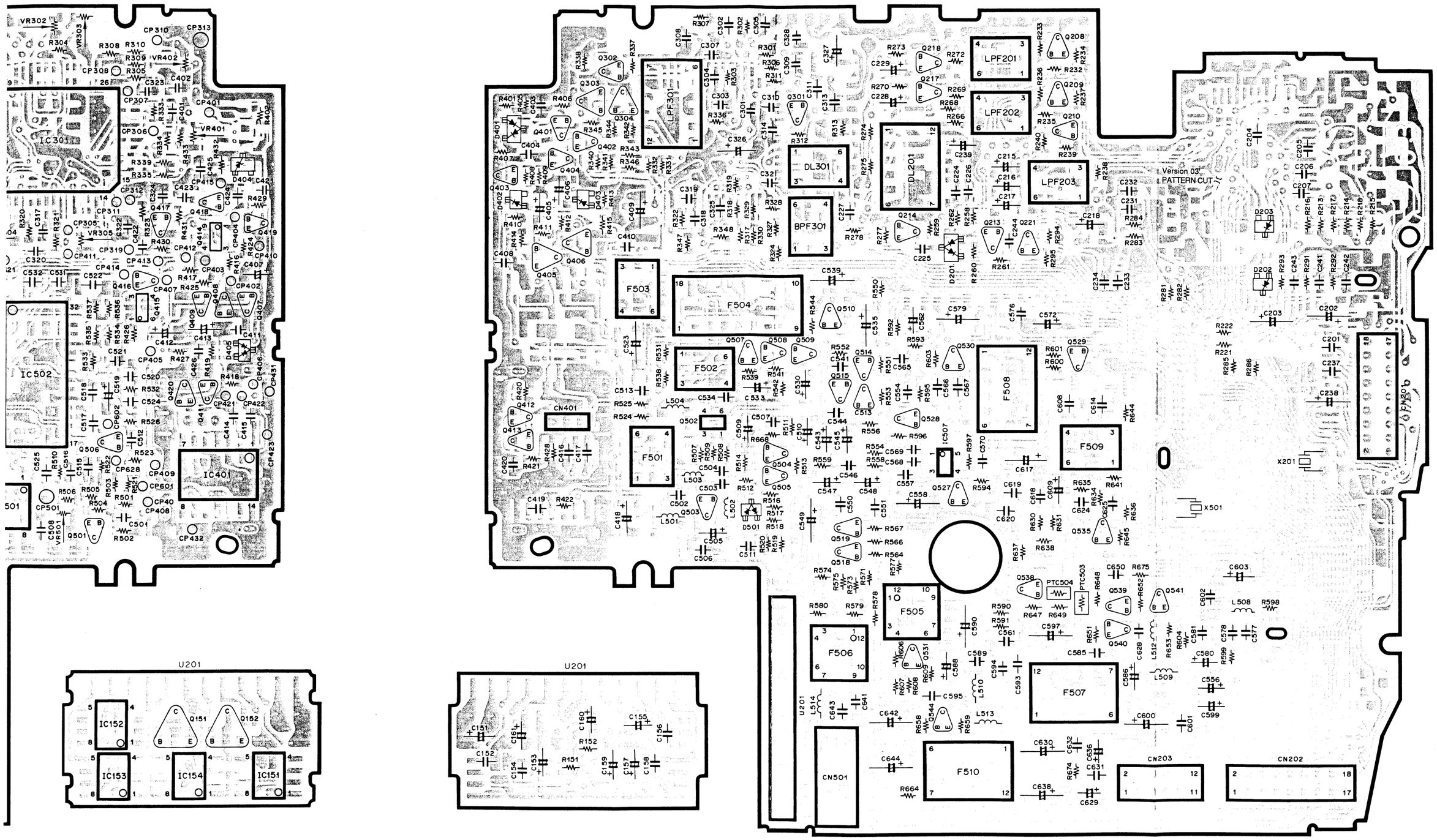
3-12. VIDEO PROCESS C.B.A. PATTERN (CLASSIFICATION A ~ E)










Version 03
PATTERN CUT
IC301
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IC152
IC153
IC154
IC151
U201
LPF201
LPF202
LPF203
DL301
DL201
BPF301
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CN401
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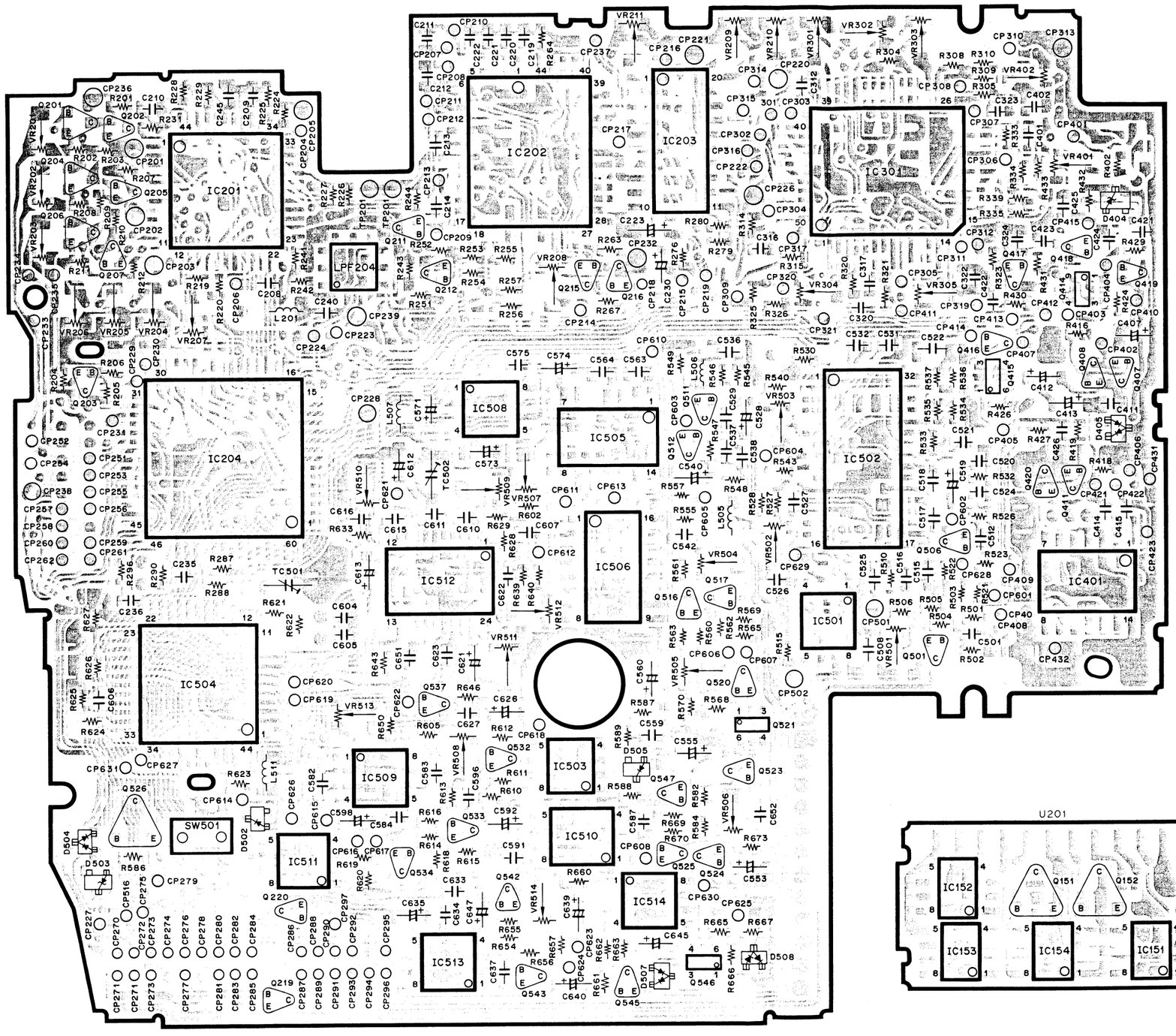
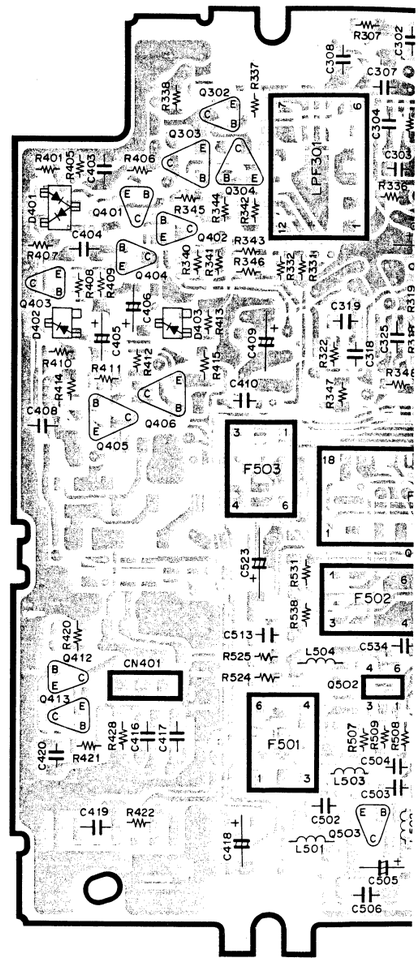
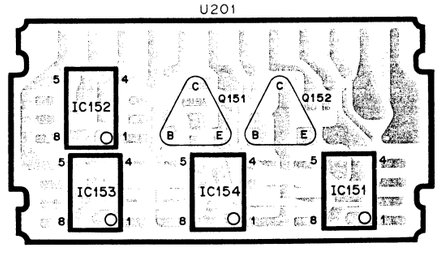
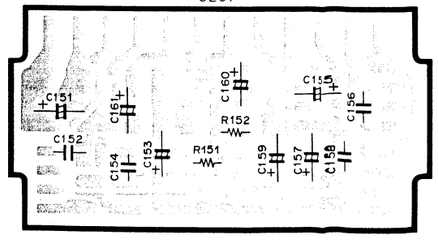
CN203
CN202
X201
X501

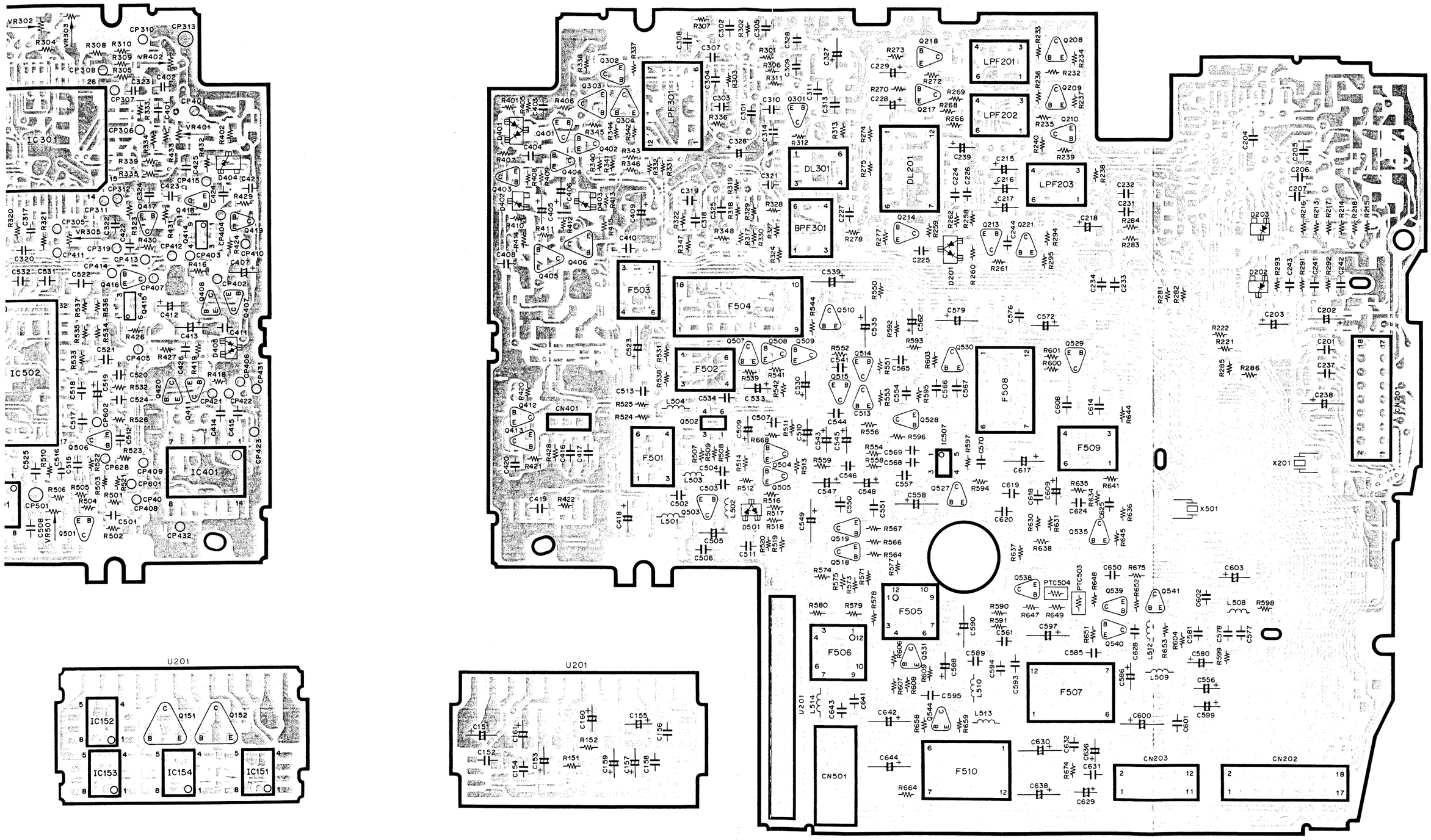
VIDEO PROCESS C.B.A. PATTERN (CLASSIFICATION F)







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DL201
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LPF301
LPF201
LPF202
LPF203
CN401
CN501
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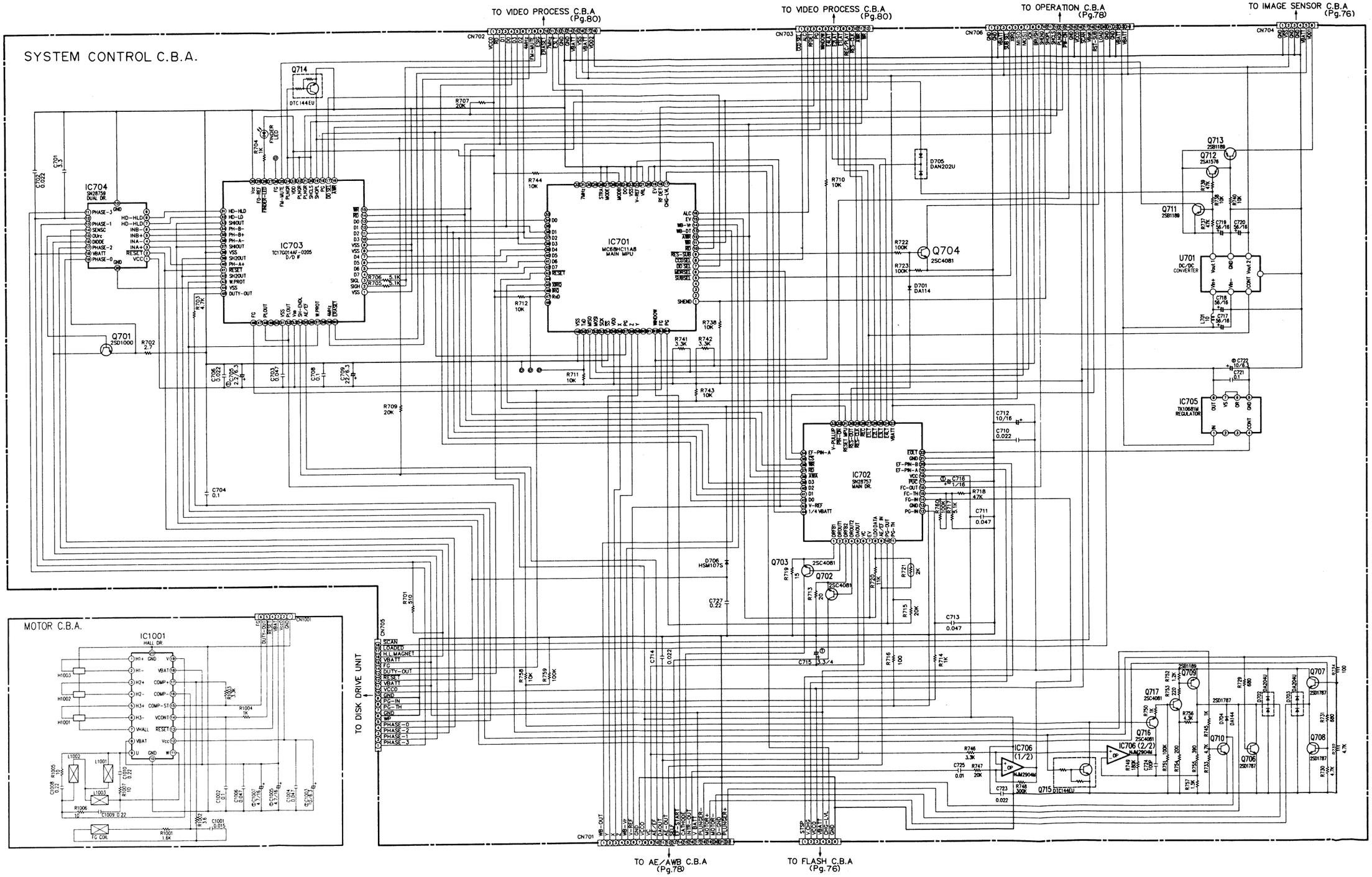
CN202
X201
X501
PTC504
PTC503

3-13. SYSTEM CONTROL C.B.A. SCHEMATIC DIAGRAM



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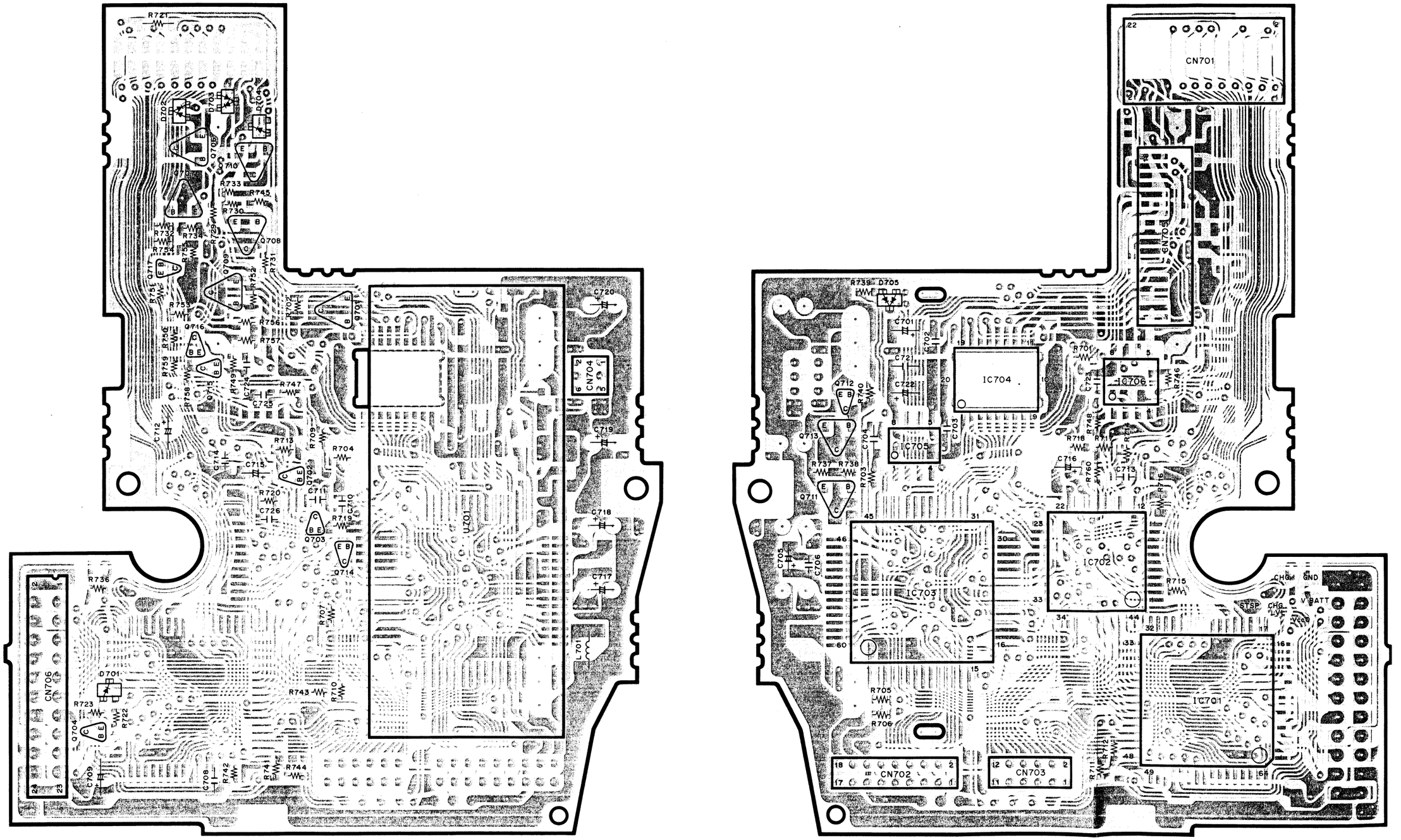
3-14. SYSTEM CONTROL C.B.A. PATTERN



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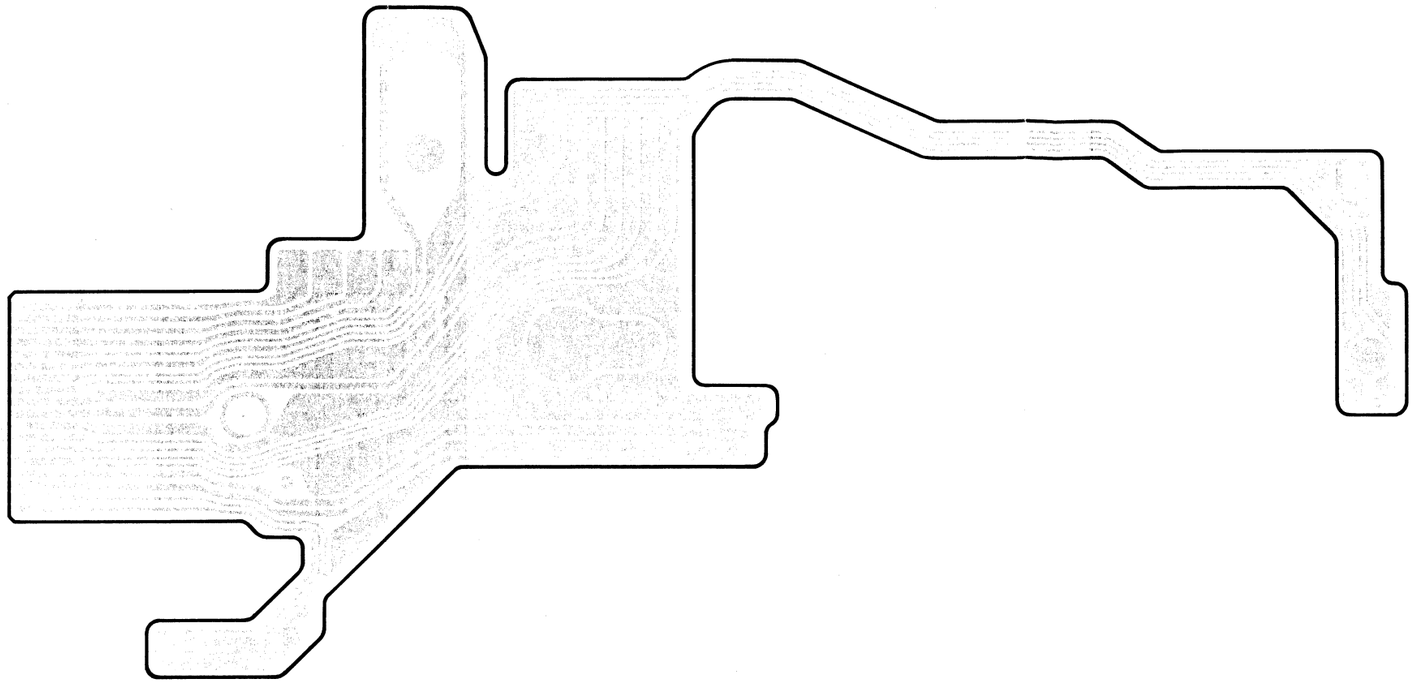
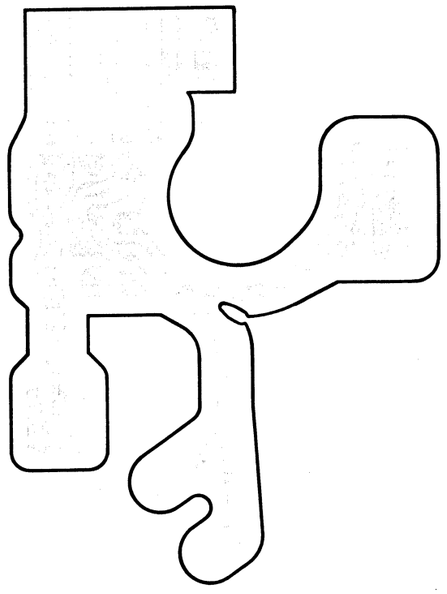
3-15. DISK DRIVE FLEX PATTERN



3-16. SHUTTER FLEX PATTERN



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4. ELECTRIC PARTS LIST

R C − 2 5 1

REF NO. C81-0111 (White)
C81-0112 (Black)

SYMBOL ⚠	PART NO.	DESCRIPTION	REMARKS
C8	CK9-0087-000	CAPACITOR, ELECT. 200uF 230V	
CN101	VS1-1090-018	CONNECTOR 18PIN	
CN102	VS1-1090-006	CONNECTOR 6PIN	
CN201	VS1-1087-018	CONNECTOR 18PIN	
CN202	VS1-1088-018	CONNECTOR 18PIN	
CN203	VS1-1088-012	CONNECTOR 12PIN	
CN401	VS1-0489-002	CONNECTOR 2PIN	
CN501	CK9-0142-000	PIN JACK	
CN701	VS1-1087-022	CONNECTOR 22PIN	
CN702	VS1-1090-018	CONNECTOR 18PIN	
CN703	VS1-1090-012	CONNECTOR 12PIN	
CN704	VS1-1087-006	CONNECTOR 6PIN	
CN705	VS1-0945-018	CONNECTOR 18PIN	
CN706	VS1-0882-024	CONNECTOR 24PIN	
CN801	VS1-1090-022	CONNECTOR 22PIN	
CN901	VS1-0881-024	CONNECTOR 24PIN	
D101	WA1-1154-000	DIODE RD4.7MB2, ZENER	
D102	WA1-1155-000	DIODE RD7.5MB3, ZENER	
D201	WA1-1035-000	DIODE MA157A	
D202	WA1-1152-000	DIODE DA114	
D203	WA1-1152-000	DIODE DA114	
D401	WA1-1035-000	DIODE MA157A	
D402	WA1-1152-000	DIODE DA114	
D403	WA1-1152-000	DIODE DA114	
D404	WA1-0694-000	DIODE RD5.6MB3	
D405	WA1-1153-000	DIODE DA204U	
D501	WA1-1153-000	DIODE DA204U	
D502	WA1-1152-000	DIODE DA114	
D503	WA1-1156-000	DIODE RD8.2MB3, ZENER	
D504	WA1-1035-000	DIODE MA157A	
D505	WA1-1152-000	DIODE DA114	
D507	WA1-1035-000	DIODE MA157A	
D508	WA1-1153-000	DIODE DA204U	
D701	WA1-1152-000	DIODE DA114	
D702	WA1-1153-000	DIODE DA204U	
D703	WA1-1153-000	DIODE DA204U	
D704	WA1-1152-000	DIODE DA114	
D705	WA1-1164-000	DIODE DAN202U	
D902	WA1-1152-000	DIODE DA114	
D903	WA1-1152-000	DIODE DA114	
FS901	CK4-0208-000	IC D2500, LINK	

RC－251

REF NO. C81-0111 (White)
C81-0112 (Black)

SYMBOL ⚠	PART NO.	DESCRIPTION	REMARKS
IC102	CK4-0166-000	IC SN28895, CCD DRIVER	
IC103	CK4-0005-000	IC TL1593, S/H	
IC151	WA4-0789-000	IC TK10681M, REGULATOR	
IC152	WA4-0789-000	IC TK10681M, REGULATOR	
IC153	WA4-0789-000	IC TK10681M, REGULATOR	
IC154	WA4-0789-000	IC TK10681M, REGULATOR	
IC201	CK4-0136-000	IC TL1051, PRE-PRO	
IC202	WA4-0958-000	IC HA11882AMP, PROCESS	
IC203	CK4-0165-000	IC MB43496, φ-CORR	
IC204	CK4-0167-000	IC SN28892, CLOCK	
IC401	WA4-0956-000	IC M51460FP, PRE-AMP	
IC501	WA4-0310-000	IC NJM2904M, OP-AMP	
IC502	WA4-1174-000	IC AN3321S, DEMOD	
IC503	WA4-0937-000	IC UPC393G, COMPARATOR	
IC504	CK4-0206-000	IC TC110G03AU-0010, SSG	
IC505	WA3-5335-000	IC TC74HC4066AF, ANALOG SW	
IC506	WA3-4014-000	IC TC74HC4053AF, ANALOG SW	
IC507	WA4-1332-000	IC NJM2406F, COMPARATOR	
IC508	WA4-1329-000	IC MSM6985MS, 1H DL	
IC509	WA4-1331-000	IC NJM2238M, OSC	
IC510	WA4-1326-000	IC CXL5003M, 1H DL	
IC511	WA4-1229-000	IC AN6308S, ANALOG SW	
IC512	WA4-1327-000	IC M51272FP, ENCORDER	
IC513	WA4-1328-000	IC MSM6989MS, 1/2H DL	
IC514	WA4-1330-000	IC NJM2235M, ANALOG SW	
IC702	CK4-0143-000	IC SN28757, MAIN DR.	
IC703	CK4-0171-000	IC TC17G014AF-0205, D.D. I/F	
IC704	CK4-0145-000	IC SN28759, DUAL DR.	
IC705	WA4-0789-000	IC TK10681M, REGULATOR	
IC706	WA4-0310-000	IC NJM2904M, OP-AMP	
IC801	CH4-0160-000	IC T8123, AE/EF SENSOR	
IC802	CK4-0173-000	IC M51095AFP, AWB	
IC901	CK4-0209-000	IC M34200M4-GP, SUB CPU	
IC902	WA4-1176-000	IC RH5RA30A, REGULATOR	
LED801	WG1-5009-000	LED GL1HD111	
Q101	WA2-1402-000	TRANSISTOR 2SB1189	
Q102	WA2-1400-000	TRANSISTOR 2SA1576	
Q103	WA2-1403-000	TRANSISTOR 2SD1767	
Q104	WA2-1400-000	TRANSISTOR 2SA1576	
Q105	WA2-1403-000	TRANSISTOR 2SD1767	
Q106	WA2-1402-000	TRANSISTOR 2SB1189	
Q151	WA2-1403-000	TRANSISTOR 2SD1767	
Q152	WA2-1403-000	TRANSISTOR 2SD1767	
Q201	WA2-0839-000	TRANSISTOR 2SA1226	
Q202	WA2-1400-000	TRANSISTOR 2SA1576	

RC-251

REF NO. C81-0111 (White)
C81-0112 (Black)

SYMBOL ⚠	PART NO.	DESCRIPTION	REMARKS
Q203	WA2-1337-000	TRANSISTOR 2SC4081	
Q204	WA2-0839-000	TRANSISTOR 2SA1226	
Q205	WA2-1400-000	TRANSISTOR 2SA1576	
Q206	WA2-0839-000	TRANSISTOR 2SA1226	
Q207	WA2-1400-000	TRANSISTOR 2SA1576	
Q208	WA2-1400-000	TRANSISTOR 2SA1576	
Q209	WA2-1400-000	TRANSISTOR 2SA1576	
Q210	WA2-1400-000	TRANSISTOR 2SA1576	
Q211	WA2-1400-000	TRANSISTOR 2SA1576	
Q212	WA2-1337-000	TRANSISTOR 2SC4081	
Q213	WA2-1337-000	TRANSISTOR 2SC4081	
Q214	WA2-1337-000	TRANSISTOR 2SC4081	
Q215	WA2-1337-000	TRANSISTOR 2SC4081	
Q216	WA2-1400-000	TRANSISTOR 2SA1576	
Q217	WA2-1337-000	TRANSISTOR 2SC4081	
Q218	WA2-1337-000	TRANSISTOR 2SC4081	
Q219	WA2-1407-000	TRANSISTOR DTC114TU	
Q220	WA2-5062-000	TRANSISTOR DTC144TU	
Q221	WA2-1337-000	TRANSISTOR 2SC4081	
Q301	WA2-1400-000	TRANSISTOR 2SA1576	
Q302	WA2-1400-000	TRANSISTOR 2SA1576	
Q303	WA2-1065-000	TRANSISTOR 2SC2223	
Q304	WA2-0839-000	TRANSISTOR 2SA1226	
Q401	WA2-1401-000	TRANSISTOR 2SC4099	
Q402	WA2-1401-000	TRANSISTOR 2SC4099	
Q403	WA2-1400-000	TRANSISTOR 2SA1576	
Q404	WA2-1337-000	TRANSISTOR 2SC4081	
Q405	WA2-1104-000	TRANSISTOR 2SC3739	
Q406	WA2-1103-000	TRANSISTOR 2SA1464	
Q407	WA2-1337-000	TRANSISTOR 2SC4081	
Q408	WA2-1337-000	TRANSISTOR 2SC4081	
Q409	WA2-1337-000	TRANSISTOR 2SC4081	Class. A～E
Q411	WA2-1337-000	TRANSISTOR 2SC4081	
Q412	WA2-1337-000	TRANSISTOR 2SC4081	
Q413	WA2-1337-000	TRANSISTOR 2SC4081	
Q414	WA2-1255-000	TRANSISTOR IMB1	
Q415	WA2-1198-000	TRANSISTOR IMD2	
Q416	WA2-1405-000	TRANSISTOR DTA124EU	
Q417	WA2-1406-000	TRANSISTOR DTC124EU	
Q418	WA2-1337-000	TRANSISTOR 2SC4081	
Q419	WA2-1400-000	TRANSISTOR 2SA1576	
Q420	WA2-1337-000	TRANSISTOR 2SC4081	
Q501	WA2-1401-000	TRANSISTOR 2SC4099	
Q502	WA2-1231-000	TRANSISTOR IMH8	
Q503	WA2-1337-000	TRANSISTOR 2SC4081	
Q504	WA2-1401-000	TRANSISTOR 2SC4099	

SYMBOL	⚠	PART NO.	DESCRIPTION	REMARKS
Q505		WA2-1401-000	TRANSISTOR 2SC4099	
Q506		WA2-1337-000	TRANSISTOR 2SC4081	
Q507		WA2-1400-000	TRANSISTOR 2SA1576	
Q508		WA2-1337-000	TRANSISTOR 2SC4081	
Q509		WA2-1337-000	TRANSISTOR 2SC4081	
Q510		WA2-1400-000	TRANSISTOR 2SA1576	
Q511		WA2-1401-000	TRANSISTOR 2SC4099	
Q512		WA2-1337-000	TRANSISTOR 2SC4081	
Q513		WA2-1400-000	TRANSISTOR 2SA1576	
Q514		WA2-1337-000	TRANSISTOR 2SC4081	
Q515		WA2-1337-000	TRANSISTOR 2SC4081	
Q516		WA2-1400-000	TRANSISTOR 2SA1576	
Q517		WA2-1401-000	TRANSISTOR 2SC4099	
Q518		WA2-1401-000	TRANSISTOR 2SC4099	
Q519		WA2-1401-000	TRANSISTOR 2SC4099	
Q520		WA2-1337-000	TRANSISTOR 2SC4081	
Q521		WA2-1201-000	TRANSISTOR IMZ2	
Q523		WA2-1400-000	TRANSISTOR 2SA1576	
Q524		WA2-1337-000	TRANSISTOR 2SC4081	
Q525		WA2-1337-000	TRANSISTOR 2SC4081	
Q526		WA2-1403-000	TRANSISTOR 2SD1767	
Q527		WA2-1337-000	TRANSISTOR 2SC4081	
Q528		WA2-1337-000	TRANSISTOR 2SC4081	
Q529		WA2-1400-000	TRANSISTOR 2SA1576	
Q530		WA2-1337-000	TRANSISTOR 2SC4081	
Q531		WA2-1400-000	TRANSISTOR 2SA1576	
Q532		WA2-1337-000	TRANSISTOR 2SC4081	
Q533		WA2-1401-000	TRANSISTOR 2SC4099	
Q534		WA2-1337-000	TRANSISTOR 2SC4081	
Q535		WA2-1406-000	TRANSISTOR DTC124EU	
Q537		WA2-1400-000	TRANSISTOR 2SA1576	
Q538		WA2-1337-000	TRANSISTOR 2SC4081	
Q539		WA2-1337-000	TRANSISTOR 2SC4081	
Q540		WA2-1337-000	TRANSISTOR 2SC4081	
Q541		WA2-1400-000	TRANSISTOR 2SA1576	
Q542		WA2-1337-000	TRANSISTOR 2SC4081	
Q543		WA2-1401-000	TRANSISTOR 2SC4099	
Q544		WA2-1337-000	TRANSISTOR 2SC4081	
Q545		WA2-1337-000	TRANSISTOR 2SC4081	
Q546		WA2-1201-000	TRANSISTOR IMZ2	
Q547		WA2-1400-000	TRANSISTOR 2SA1576	
Q701		WA2-1282-000	TRANSISTOR 2SD1000	
Q702		WA2-1337-000	TRANSISTOR 2SC4081	
Q703		WA2-1337-000	TRANSISTOR 2SC4081	
Q704		WA2-1337-000	TRANSISTOR 2SC4081	
Q706		WA2-1403-000	TRANSISTOR 2SD1767	
Q707		WA2-1403-000	TRANSISTOR 2SD1767	

REF NO. C81-0111 (White)
C81-0112 (Black)

SYMBOL	⚠	PART NO.	DESCRIPTION	REMARKS
Q708		WA2-1403-000	TRANSISTOR 2SD1767	
Q709		WA2-1402-000	TRANSISTOR 2SB1189	
Q710		WA2-1403-000	TRANSISTOR 2SD1767	
Q711		WA2-1402-000	TRANSISTOR 2SB1189	
Q712		WA2-1400-000	TRANSISTOR 2SA1576	
Q713		WA2-1402-000	TRANSISTOR 2SB1189	
Q714		WA2-1378-000	TRANSISTOR DTC144EU	
Q715		WA2-1378-000	TRANSISTOR DTC144EU	
Q716		WA2-1337-000	TRANSISTOR 2SC4081	
Q717		WA2-1337-000	TRANSISTOR 2SC4081	
Q801		WA2-1400-000	TRANSISTOR 2SA1576	
Q902		WA2-1337-000	TRANSISTOR 2SC4081	
SW501		WC3-0181-000	SWITCH, SLIDE	
SW901		WC2-0196-000	SWITCH, PUSH	
SW902		WC2-0196-000	SWITCH, PUSH	
SW903		WC2-0196-000	SWITCH, PUSH	
SW904		WC3-0182-000	SWITCH, SLIDE	
SW905		WC3-0182-000	SWITCH, SLIDE	
SW906		WC2-0198-000	SWITCH,	
SW907		WC2-0196-000	SWITCH, TACT	
SW908		WC2-0197-000	SWITCH,	
U701		CK3-0014-000	DC/DC CONVERTOR	
X201		WK2-0580-000	X'TAL OSCILLATOR 28.4375 MHz	
X501		WK2-0579-000	X'TAL OSCILLATOR 17.734MHz	Class.A,B,C
X501		WK2-5037-000	X'TAL OSCILLATOR 17.734MHz	Class.D
X901		WK2-0520-000	OSCILLATOR, CERA 800KHz	
X902		WK2-0502-000	X'TAL OSCILLATOR 32.768KHz	
Xe1		CK9-0089-000	LAMP, XENON	

PARTS CATALOG

1. EXPLODED VIEW 95
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  (2) INTERNAL 96
  (3) FINDER, LENS BLOCK 97
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 1-3. AC COUPLER AV-C25 98
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RC－251	REF. NO. C81-0111 (White)
	REF. NO. C81-0112 (Black)
BA－24P	REF. NO. C86-0187 (B)
	REF. NO. C86-0188 (E)
	REF. NO. C86-0189 (A)
AV－C25	REF. NO. C86-0651

PARTS POLICY

The policy of still video service, Tokyo is to stock all parts necessary to effect efficien economical service. It is neither necessary nor technically feasible to stock separately every parts that goes into each product.
In establishing the spare parts list, we consider repair difficulty, labor cost, special tool requirements and individual parts Vs. assembled unit cost to termine in which from parts will be stocked.

1. RC－251

The unitslisted below are stocked as unit because they require tools or technics not normally avaible at field service level.

CM1-0258-000 Shutter Unit
CM1-0272-000 LED Unit
CM1-0331-000 Disk Drive Unit (See Pg. 34, 35)
CY1-6229-000 Image Sensor Unit
CY1-6231-000 Disk Drive Unit (See Pg. 34, 35)

Some individual parts are stocked for the following units, in addition to the unit.

CM1-0252-000	Finder Unit	CY1-6217-000	Front Ring Unit
CM1-0263-000	AE/AWB Sensor Unit	CY1-6227-000	Top Cover Unit (White)
CM1-0332-000	Flash Unit	CY1-6228-000	Top Cover Unit (Black)
CM1-0335-000	System Control C. B. A.	CY1-6230-000	Video Process C. B. A.
CM1-0336-000	Operation C. B. A.		

2. BA－24P／AV－C25

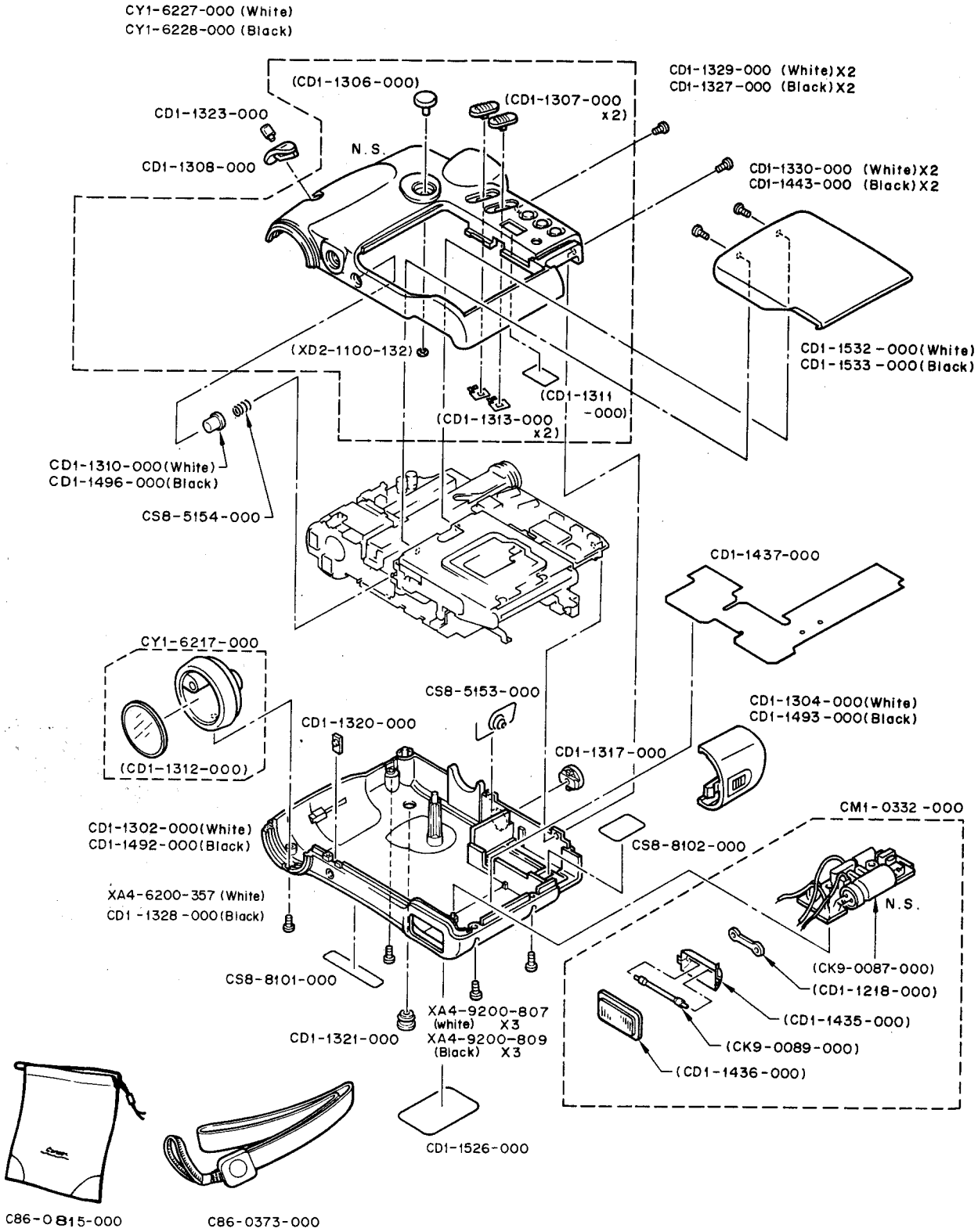
The spare parts list is adjusted periodically to insure the necessary parts are always available, and unnecessary parts are removed from the stock list.

- Individual electronic parts which are likely to need replecement are stocked.
- The spare parts list is adjusted periiodically to insure the necessary parts are always available, and unnecessary parts are removed from the stock list.
- ⚠:Parts bearing this make are critical to safe operation of the equipment. Use only the specified parts when replacing them.

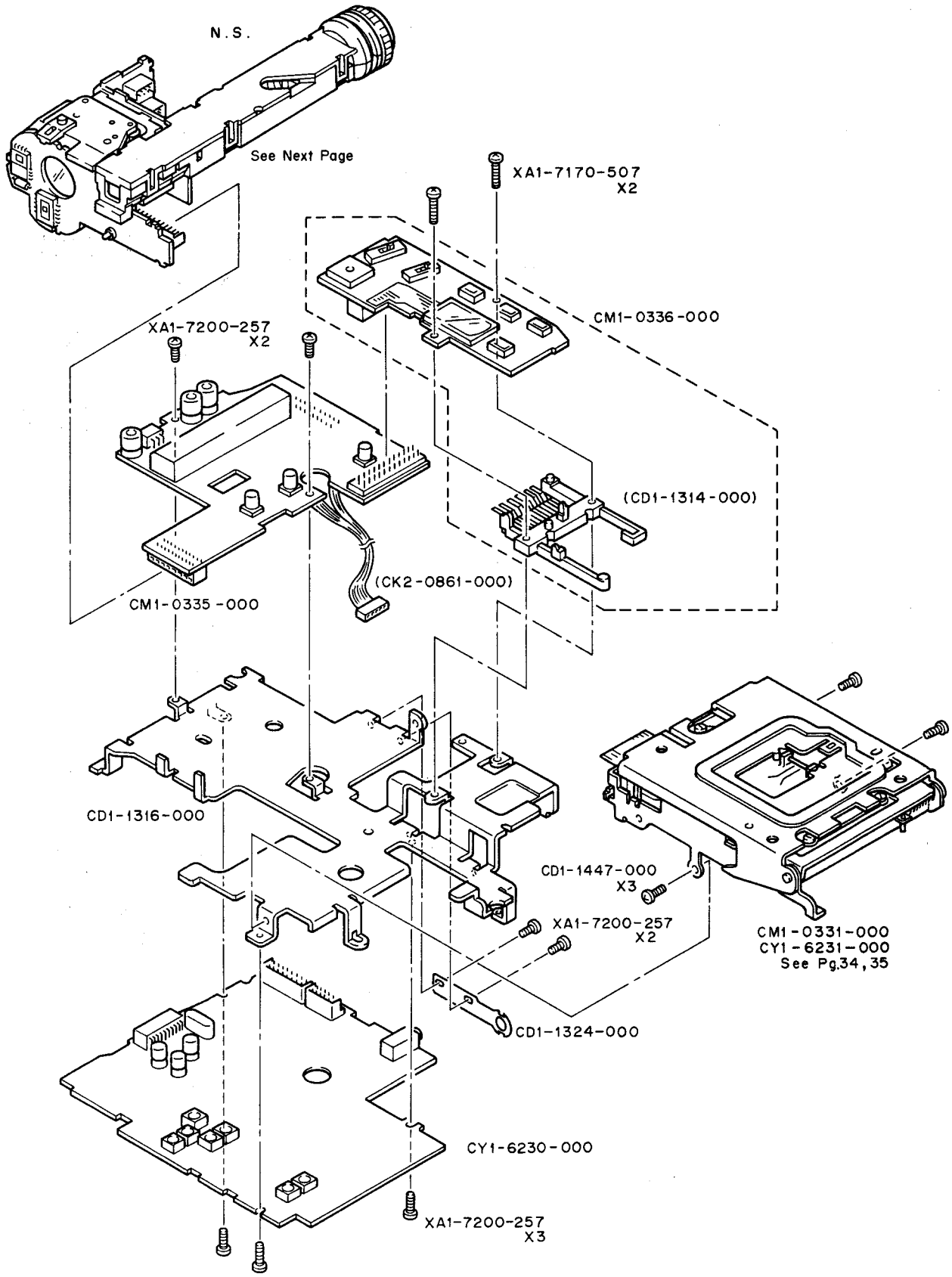
1. EXPLODED VIEW

1-1. RC-251

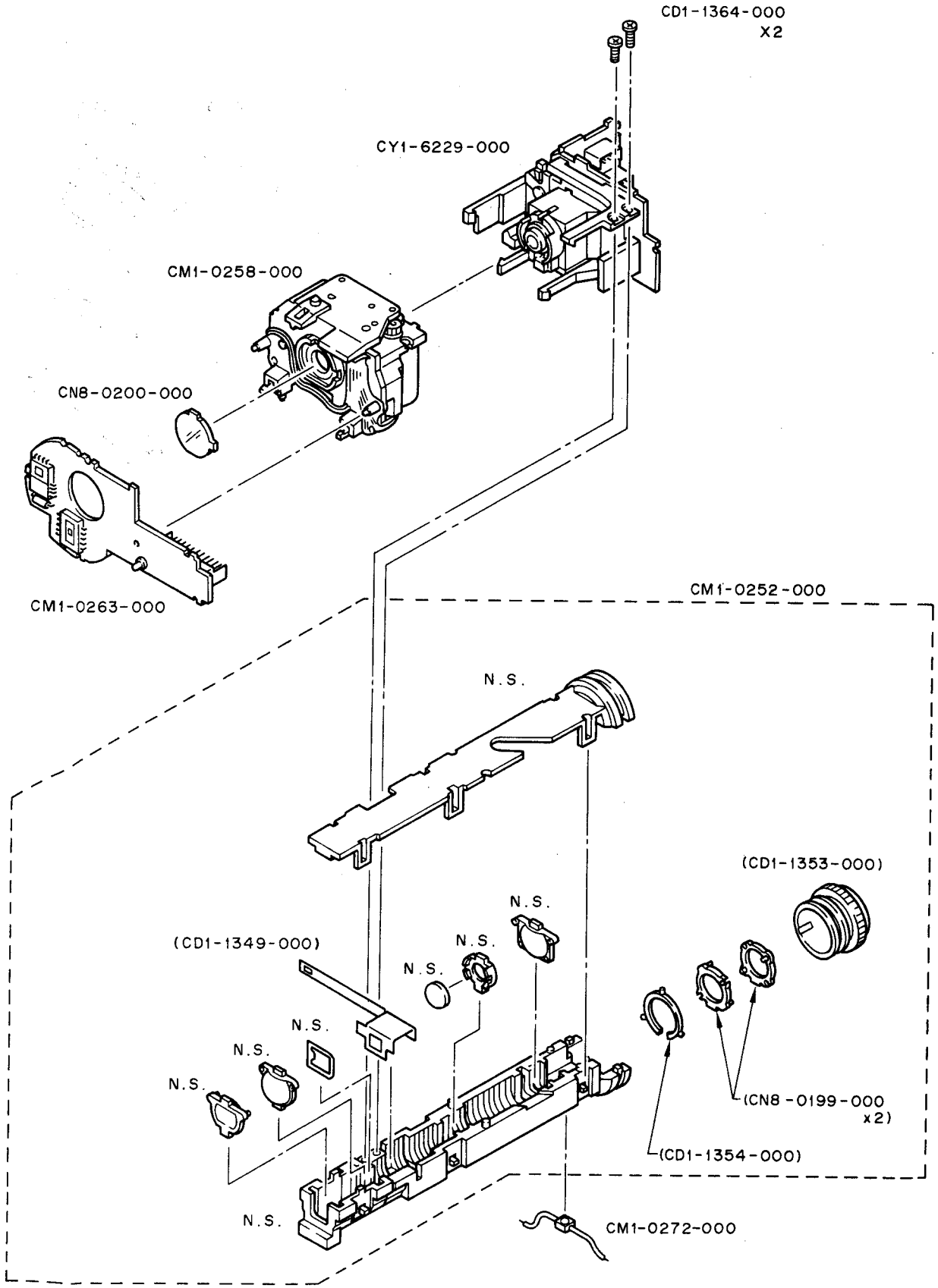
(1) COVER



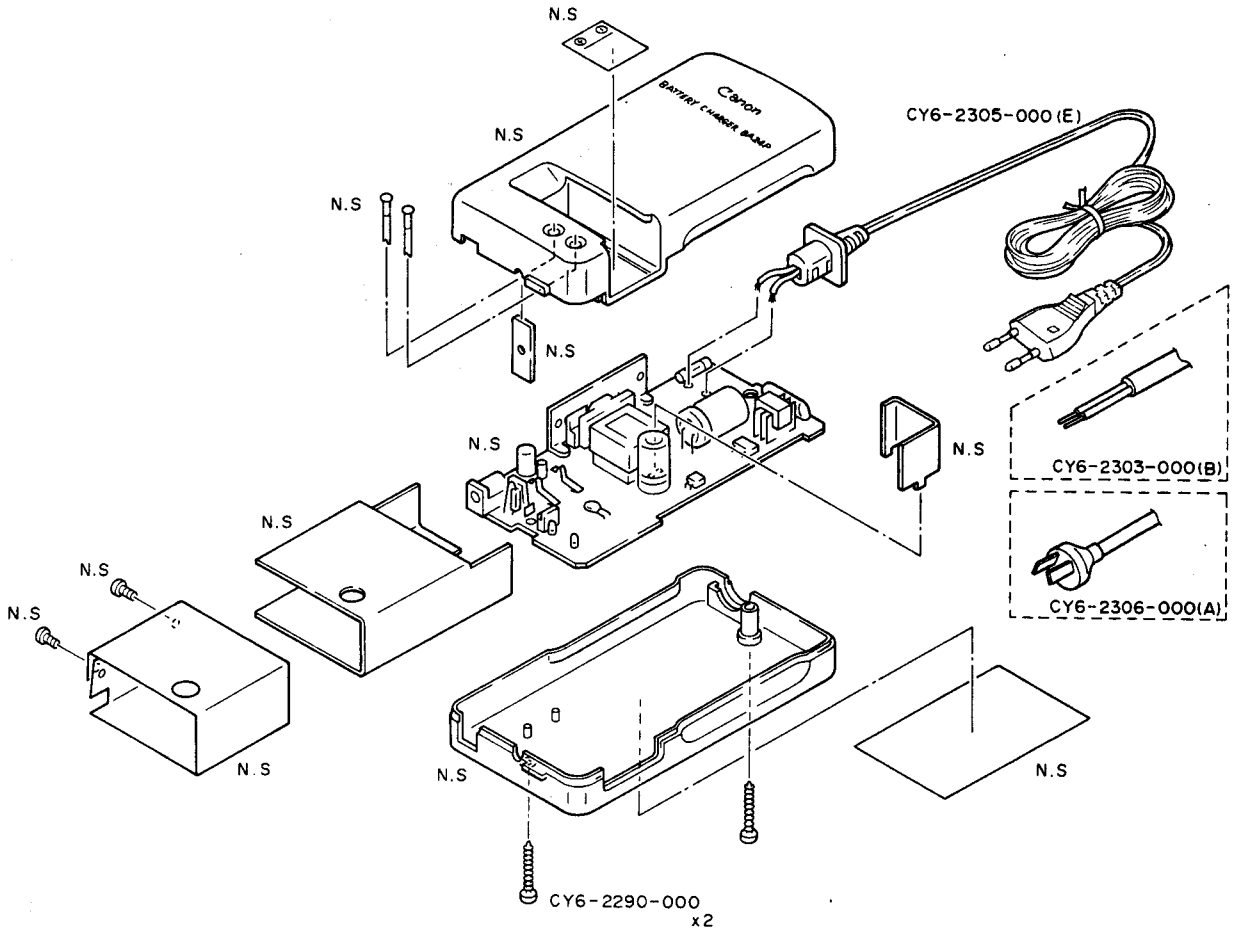
(2) INTERNAL


N.S.
See Next Page
XA1-7170-507
X2
CM1-0336-000
XA1-7200-257
X2
(CD1-1314-000)
(CK2-0861-000)
CM1-0335-000
CD1-1316-000
CD1-1447-000
X3
XA1-7200-257
X2
CM1-0331-000
CY1-6231-000
See Pg.34,35
CD1-1324-000
CY1-6230-000
XA1-7200-257
X3

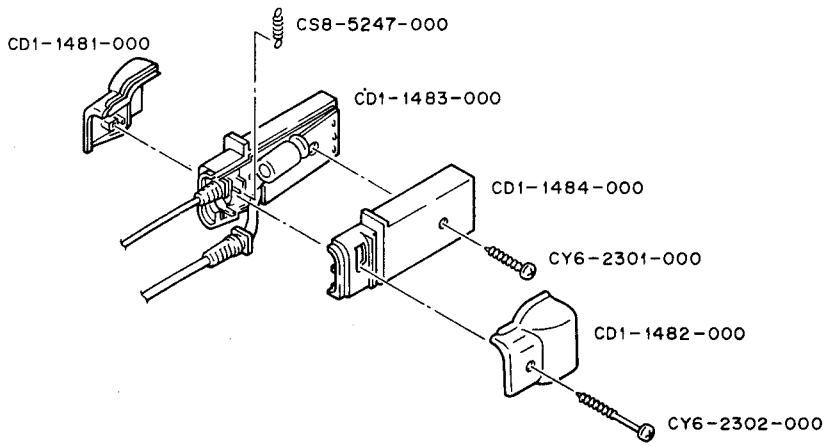
(3) FINDER, LENS BLOCK



1-2. BATTERY CHARGER BA-24P



1-3. AC COUPLER AV-C25



2. PARTS LIST

2-1. RC-251

REF NO. C81-0111 (White)
C81-0112 (Black)

NEW ⚠	PART NO.	CLASS	QTY	DESCRIPTION	Pg	REMARKS
	CD1-1218-000	E	1	HOLDER, XENON LAMP	95	
	CD1-1302-000	E	1	COVER, BOTTOM (WHITE)	95	White
	CD1-1304-000	E	1	COVER, BATTERY (WHITE)	95	White
	CD1-1306-000	E	1	BUTTON, SHUTTER	95	
	CD1-1307-000	E	2	KNOB, SLIDE	95	
	CD1-1308-000	E	1	KNOB, SLIDE	95	
	CD1-1310-000	E	1	BUTTON, EJECT (WHITE)	95	White
	CD1-1311-000	E	1	GLASS, LCD	95	
	CD1-1312-000	E	1	GLASS, FRONT RING	95	
	CD1-1313-000	E	2	FORK, SLIDE KNOB	95	
	CD1-1314-000	E	1	CONTACT, BATTEERY	96	
	CD1-1316-000	E	1	CHASSIS, MAIN	96	
	CD1-1317-000	E	1	COVER, JACK	95	
	CD1-1320-000	E	1	WINDOW, SELF LED	95	
	CD1-1321-000	E	1	CAP, SWICH	95	
	CD1-1323-000	E	1	BUTTON, MACRO LEVER LOCK	95	
	CD1-1324-000	E	1	PLATE, JACK	96	
	CD1-1327-000	E	2	SCREW, CROSS RECESS, PH	95	Black
	CD1-1328-000	E	1	SCREW, CROSS RECESS PH	95	Black
	CD1-1329-000	E	2	SCREW, CROSS RECESS PH	95	White
	CD1-1330-000	E	2	SCREW, CROSS RECESS PH	95	White
	CD1-1349-000	E	1	MASK, FINDER	97	
	CD1-1353-000	E	1	RING, EYEPOINT	97	
	CD1-1354-000	E	1	RING, EYEPIECE	97	
	CD1-1364-000	E	2	SCREW, CROSS RECESS PH	97	
	CD1-1435-000	E	1	REFLECTOR	95	
	CD1-1436-000	E	1	PANEL, FLASH	95	
	CD1-1437-000	E	1	SHIELD, LIGHT	95	
	CD1-1443-000	E	2	SCREW, CROSS RECESS PH	95	Black
	CD1-1447-000	E	3	SCREW, CROSS RECESS PH	96	
	CD1-1492-000	E	1	COVER, BOTTOM (BLACK)	95	Black
	CD1-1493-000	E	1	COVER, BATTERY (BLACK)	95	Black
	CD1-1496-000	E	1	BUTTON, EJECT (BLACK)	95	Black
*	CD1-1526-000	E	1	PLATE, SAFTY	95	
*	CD1-1532-000	E	1	COVER, DISK (WHITE)	95	White

RC－251 REF NO. C81-0111 (White)
C81-0112 (Black)

NEW ⚠	PART NO.	CLASS	QTY	DESCRIPTION	Pg	REMARKS
*	CD1-1533-000	E	1	COVER, DISK (BLACK)	95	Black
	CH4-0160-000	E	1	IC T8123, AE/EF SENSOR		
	CK2-0861-000	E	1	CONNECTOR, FLASH	96	
*	CK3-0014-000	E	1	DC/DC CONVERTER		
	CK4-0005-000	E	1	IC TL1593, SAMPLE/HOLD		
	CK4-0136-000	E	1	IC TL1051, PRE PROCESS		
	CK4-0143-000	E	1	IC SN28757, DRIVER		
	CK4-0145-000	E	1	IC SN28759, DRIVER		
	CK4-0165-000	E	1	IC MB43496, Y CORR.		
	CK4-0166-000	E	1	IC SN28895, CCD DRIVER		
	CK4-0167-000	E	1	IC SN28892, CLOCK		
	CK4-0171-000	E	1	IC TC17G014AF-0205, D.D. I/F		
	CK4-0173-000	E	1	IC M51095AFP, AWB		
*	CK4-0206-000	E	1	IC TC110G03AU-0010, SSG		
*	CK4-0208-000	E	1	IC D2500, FUSE		
*	CK4-0209-000	E	1	IC M34200M4-GP, SUB M.P.U.		
	CK9-0087-000	E	1	CAPACITOR, ELECT. 200UF 230V	95	
	CK9-0089-000	E	1	LAMP, XENON	95	
*	CK9-0142-000	E	1	JACK		
	CM1-0252-000	E	1	FINDER UNIT	97	
	CM1-0258-000	E	1	SHUTTER UNIT	97	
	CM1-0263-000	E	1	AE/AWB SENSOR C.B.A.	97	
	CM1-0272-000	E	1	LED, FINDER	97	
*	CM1-0331-000	E	1	DISK DRIVE UNIT	96	See Pg. 34, 35
*	CM1-0332-000	E	1	FLASH UNIT	95	
*	CM1-0335-000	E	1	SYSTEM CONTROL C.B.A.	96	
*	CM1-0336-000	E	1	OPERATION C.B.A.	96	
	CN8-0199-000	E	2	LENS ELEMENT, EYEPIECE	97	
	CN8-0200-000	E	1	FILTER, OPTICAL LPF	97	
	CS8-5153-000	E	1	SPRING, BATTERY PUSH	95	
	CS8-5154-000	E	1	SPRING, EJECT BUTTON	95	
	CS8-8101-000	E	1	PLATE, NAME	95	
	CS8-8102-000	E	1	PLATE, BATTERY	95	
	CY1-6217-000	E	1	FRONT RING UNIT	95	
*	CY1-6227-000	E	1	TOP COVER UNIT (WHITE)	95	White
*	CY1-6228-000	E	1	TOP COVER UNIT (BLACK)	95	Black
*	CY1-6229-000	E	1	IMAGE SENSOR UNIT	97	
*	CY1-6230-000	E	1	VIDEO PROCESS C.B.A.	96	
*	CY1-6231-000	E	1	DISK DRIVE UNIT	96	See Pg. 34, 35
*	C86-0373-000	E	1	WRIST STRAP	95	WS-C25

R C − 2 5 1

REF NO. C81-0111 (White)
C81-0112 (Black)

NEW ⚠	PART NO.	CLASS	QTY	DESCRIPTION	Pg	REMARKS
*	C86-0815-000	E	1	SOFT CASE	95	SC-C25
*	VS1-0489-002	E	1	CONNECTOR 2PIN		
	VS1-0881-024	E	1	CONNECTOR 24PIN		
	VS1-0882-024	E	1	CONNECTOR 24PIN		
	VS1-0945-018	E	1	CONNECTOR 18PIN		
	VS1-1087-006	E	1	CONNECTOR 6PIN		
	VS1-1087-018	E	1	CONNECTOR 18PIN		
	VS1-1087-022	E	1	CONNECTOR 22PIN		
	VS1-1088-012	E	1	CONNECTOR 12PIN		
	VS1-1088-018	E	1	CONNECTOR 18PIN		
	VS1-1090-006	E	1	CONNECTOR 6PIN		
	VS1-1090-012	E	1	CONNECTOR 12PIN		
	VS1-1090-018	E	2	CONNECTOR 18PIN		
	VS1-1090-022	E	1	CONNECTOR 22PIN		
	WA1-0694-000	E	1	DIODE RD5.6MB3		
*	WA1-1035-000	E	4	DIODE MA157A		
	WA1-1152-000	E	10	DIODE DA114		
	WA1-1153-000	E	5	DIODE DA204U		
	WA1-1154-000	E	1	DIODE RD4.7MB2, ZENER		
	WA1-1155-000	E	1	DIODE RD7.5MB3, ZENER		
	WA1-1156-000	E	1	DIODE RD8.2MB3, ZENNER		
	WA1-1164-000	E	1	DIODE DAN202U		
	WA2-0839-000	E	4	TRANSISTOR 2SA1226		
	WA2-1065-000	E	1	TRANSISTOR 2SC2223		
	WA2-1103-000	E	1	TRANSISTOR 2SA1464		
	WA2-1104-000	E	1	TRANSISTOR 2SC3739		
	WA2-1198-000	E	1	TRANSISTOR IMD2		
*	WA2-1201-000	E	2	TRANSISTOR IMZ2		
	WA2-1231-000	E	1	TRANSISTOR IMH8		
	WA2-1255-000	E	1	TRANSISTOR IMB1		
	WA2-1282-000	E	1	TRANSISTOR 2SD1000		
	WA2-1337-000	E	45	TRANSISTOR 2SC4081		ONLY F QTY 44
	WA2-1378-000	E	2	TRANSISTOR DTC144EU		
	WA2-1400-000	E	26	TRANSISTOR 2SA1576		
	WA2-1401-000	E	11	TRANSISTOR 2SC4099		
	WA2-1402-000	E	5	TRANSISTOR 2SB1189		
	WA2-1403-000	E	9	TRANSISTOR 2SD1767		
	WA2-1405-000	E	1	TRANSISTOR DTA124EU		
	WA2-1406-000	E	2	TRANSISTOR DTC124EU		
	WA2-1407-000	E	1	TRANSISTOR DTC114TU		

RC－251

REF NO. C81-0111 (White)
C81-0112 (Black)

NEW ⚠	PART NO.	CLASS	QTY	DESCRIPTION	Pg	REMARKS
*	WA2-5062-000	E	1	TRANSISTOR DTC144TU		
	WA3-4014-000	E	1	IC TC74HC4053AF, ANALOG SW.		
	WA3-5335-000	E	1	IC TC74HC4066AF, ANALOG SW.		
	WA4-0310-000	E	2	IC NJM2904M, OP AMP.		
	WA4-0789-000	E	5	IC TK10681M, REGULATOR		
	WA4-0937-000	E	1	IC UPC393G, COMPALATOR		
	WA4-0956-000	E	1	IC M51460FP, PRE AMP.		
	WA4-0958-000	E	1	IC HA11882AMP, PROCESS		
	WA4-1174-000	E	1	IC AN3321S, DEMODILATOR		
	WA4-1176-000	E	1	IC RH5RA30A, REGULATOR		
*	WA4-1229-000	E	1	IC AN6308S, ANALOG SW		
*	WA4-1326-000	E	1	IC CXL5003M, 1H DL		
*	WA4-1327-000	E	1	IC M51272FB, ENCODER		
*	WA4-1328-000	E	1	IC MSM6989MS, 1/2H DL		
*	WA4-1329-000	E	1	IC MSM6985MS, 1H DL		
*	WA4-1330-000	E	1	IC NJM2235M, SWITCH		
*	WA4-1331-000	E	1	IC NJM2238M, SUB CARRIER		
*	WA4-1332-000	E	1	IC NJM2406M, COMPALATOR		
	WC2-0196-000	E	4	SWITCH, PUSH		
	WC2-0197-000	E	1	SWITCH, PUSH		
	WC2-0198-000	E	1	SWITCH, PUSH		
	WC3-0181-000	E	1	SWITCH, SLIDE		
	WC3-0182-000	E	2	SWITCH, SLIDE		
	WG1-5009-000	E	1	LED, SELF		
	WK2-0502-000	E	1	X'TAL OSCILLATOR, 32.768KHz		
	WK2-0520-000	E	1	CERAMIC OSCILLATOR, 800KHz		
*	WK2-0579-000	E	1	X'TAL OSCILLATOR, 17.734476MHz		Class.A,B,C
*	WK2-0580-000	E	1	X'TAL OSCILLATOR, 28.4375MHz		
*	WK2-5037-000	E	1	X'TAL OSCILLATOR, 17.734476MHz		Class.D
	XA1-7170-507		2	SCREW, CROSS-RECESS, PH	96	
	XA1-7200-257		7	SCREW, CROSS-RECESS, PH	96	
	XA4-6200-357		1	SCREW, CROSS-RECESS, PH	95	White
	XA4-9200-807		3	SCREW, CROSS-RECESS, PH	95	White
	XA4-9200-809		3	SCREW, CROSS-RECESS, PH	95	Black
	XD2-1100-132		1	WASHER, RETAINING 1.3MM	95	

2-2. BATTERY CHARGER BA-24P

REF NO. C86-0187 (B)
C86-0188 (E)
C86-0189 (A)

NEW	⚠	PART NO.	CLASS	QTY	DESCRIPTION	Pg	REMARKS
		CY6-2290-000	E	2	SCREW	98	
	⚠	CY6-2292-000	E	1	FUSE (F1) 1A, 250V		
*		CY6-2303-000	E	1	AC CORD [B]	98	BP-24PB
*	⚠	CY6-2304-000	E	1	FUSE (CP1) 250mA, 50V		
*		CY6-2305-000	E	1	AC CORD [E]	98	BP-24PE
*		CY6-2306-000	E	1	AC CORD [A]	98	BP-24PA

2-3. AC COUPLER AV-C25

REF NO. C86-0651-000

NEW	⚠	PART NO.	CLASS	QTY	DESCRIPTION	Pg.	REMARKS
*		CD1-1481-000	E	1	BATTERY COVER (A)	98	
*		CD1-1482-000	E	1	BATTERY COVER (B)	98	
*		CD1-1483-000	E	1	BATTERY CASE (C)	98	
*		CD1-1484-000	E	1	BATTERY CASE (D)	98	
*		CS8-5247-000	E	1	SPRING, COIL	98	
*		CY6-2301-000	E	1	SCREW	98	
*		CY6-2302-000	E	1	SCREW	98	

RC-251 ADDITIONAL ITEMS OF THE REPAIR INSTRUCTION TOGETHER CHANGED FORMAT OF PRODUCT

CONCERNING ADVANCEMENT OF HEAD PERFORMANCE FOR THE FIXED PAD METHOD DISK DRIVE UNIT (CY-6231-000)

The chroma recording electric current value of the video process C.B.A was changed together with advancement of head performance of RC-251. When the D.D.U. (CY1-6231-000) was changed concerning service, it is necessary to adjust the chroma recording electric current to each of new head and old head. It describes about classification method and adjustment method as follows. It is necessary to notice concerning the disk drive unit that has two types of the fixed pad method and the Bernoulli plate method, however concerning this time advancement of head performance is the object of head for D.D.U. of the fixed pad method.

1. INTERCHAGEABILITY

It is possible to interchange between new head and old head by adjusting the chroma recording electric current on the video process C.B.A.

2. CLASSIFICATION

	New Head	Old Head
Main Unit	FD1202 → 02 and after	FD1201 → 01 and before
D. D. U. (CY1-6231-000)	DL25YP → Y and after	DL25XP → X and before
Video Process C. B. A.	To display the mark of Y on the IC301.	To display the mark of X on the IC301 or not to do.
	It makes the classification by the displaying of IC301 on the C.B.A. concerning this time. (It makes the classification by displaying of the C.B.A. usually.)	

3.SERVICE COUNTERMEASURE

It doesn't change parts numbers between new type and old type concerning the D.D.U. and C.B.A., always to stock new type unit as the service parts. Therefore, when changing each of them, it is necessary to adjust the chroma recording electric current in accordance with classification. (to substitute the recording voltage in fact.) But it is unnecessary to adjust when it fits classification. Especially it doesn't have the relation to the other adjusting items.

3.1 ADJUSTING FOR THE CHROMA RECORDING VOLTAGE

(1) TOOL
Toolset for movie mode adjustment,oscilloscope.

(2) METHOD OF ADJUSTMENT

Standard VF / Standard Chart	Main SW	Measuring apparatus
	PLAY	Oscilloscope
Measuring point	Adjusting volume	Standard
CP422 (E.10)	VR402 (A.9)	Refer to NOTE

NOTE:
1. Remove a shield covering IC401.
2. Connect the CP with lead lines as shown below.
   CP407(REC/PLAY) and CP312(5V)
   CP404(REC GATE) and CP312(5V)
   CP320(FM MUTE) and CP313(GND)
3. Set the "MOVIE MODE 1" processing the MULTIPUL TOOL on this condition.
4. Measure the Y recording voltage of the CP422 with oscilloscope (PROVE 1:10). (Refer to Figure 1)
5. Read the chrome recording voltage in accordance with the classification of the D.D.U. and the Y recording voltage by using the conversion table.
6. Adjust the chroma recording voltage after measured with VR402 like 4. (Refer to Figure 3)

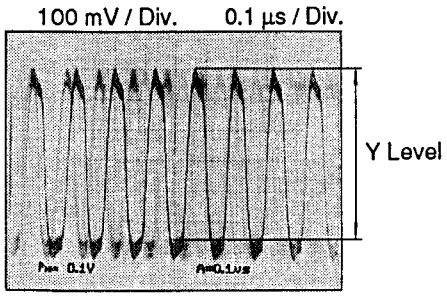


FIGURE 1 - RECORDED WAVE FORM

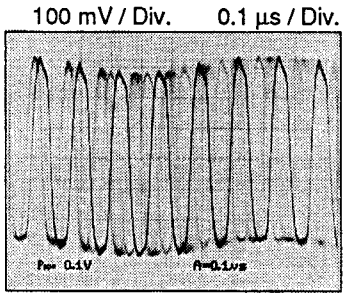


FIGURE 2 - RECORDED WAVEFORM

Overlap the Y signal and the C signal when to set a trigger of oscilloscope. To show the failure example when to set a trigger with only the Y signal in figure 2.

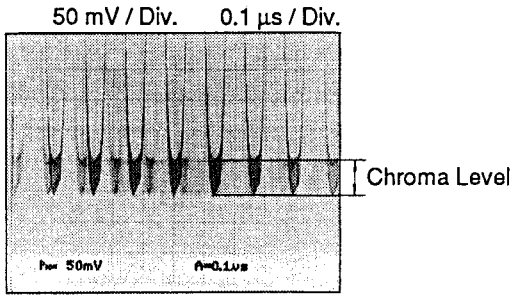


FIGURE 3 - RECORDED WAVEFORM (ENLARGED WAVEFORM FIGURE 1.)

(3) MEASUREMENT AND ADJUSTMENT LOCATIONS

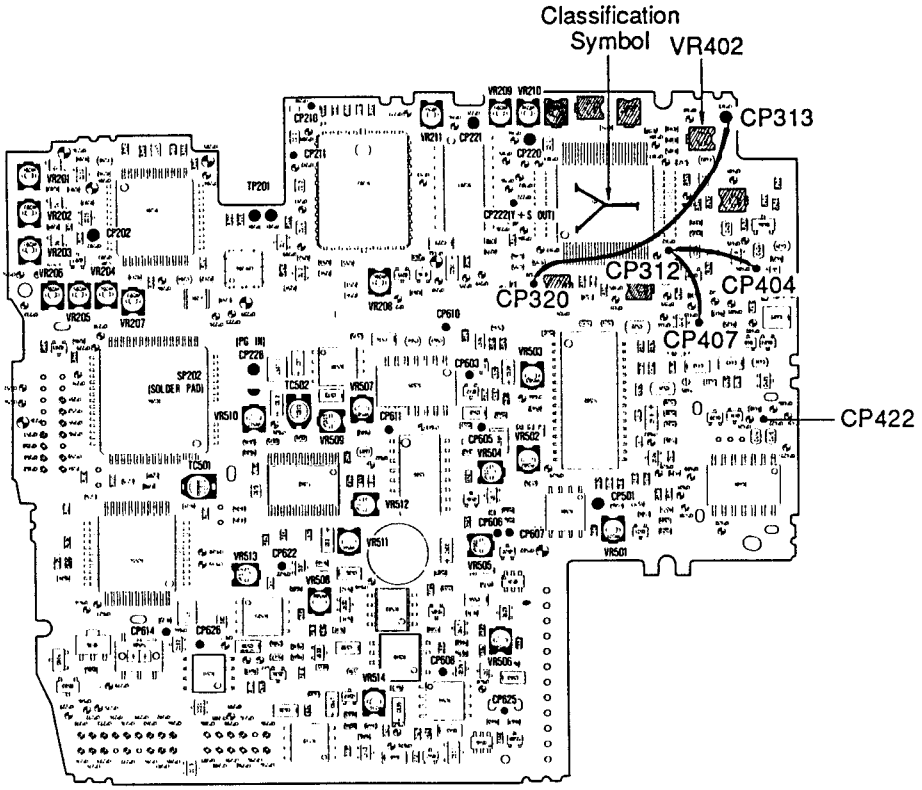


FIGURE 4 - VIDEO PROCESS C.B.A.

(4) CONVERSION TABLE

Select the chroma recording level in accordance with the type of D.D.U.after measured the Y recording level.

Calcuration $C=10^{(A/20)} \times B$

A=-19.5(New D.D.U.), -22(Old D.D.U.)
B=Y Recording Level
C=Chroma Recording Level

* It is $\pm$ 5 (mV) that is the tolerance of the chroma recording voltage.

Y Recording Level (mV)	Chroma Recording Level (mV)	
	New D.D.U.	Old D.D.U.
450	47.6	35.7
460	48.7	36.5
470	49.8	37.3
480	50.8	38.1
490	51.9	38.9
500	52.9	39.7
510	54.0	40.5
520	55.1	41.3
530	56.1	42.1
540	57.2	42.9
550	58.3	43.7

Y Recording Level (mV)	Chroma Recording Level (mV)	
	New D.D.U.	Old D.D.U.
560	59.3	44.5
570	60.4	45.3
580	61.4	46.1
590	62.5	46.9
600	63.5	47.7
610	64.6	48.5
620	65.7	49.2
630	66.7	50.0
640	67.8	50.8
650	68.9	51.6
660	69.9	54.4